ENVIRONMENTAL PROBLEMS IN CENTRAL ASIA : A CASE STUDY OF ARAL SEA CRISIS

Dissertation submitted to the Jawaharlal Nehru University
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Master of Philosophy

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Certificate

Certified that the dissertation entitled, ***ENVIRONMENTAL PROBLEMS IN CENTRAL ASIA : A CASE STUDY OF ARAL SEA CRISIS*** Submitted by **Mr. Dharmendra Kumar Shahi** in partial fulfillment of the requirements for the award of the degree of Master of Philosophy, has not been previously submitted for any other degree of this University or any other University and is his own Work.

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TO
MY MAA AND BABUJEE

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PREFACE

The world today is confronted with multiplicity of crisis, explosive political and ideological conflicts, rampant malnutrition, grinding poverty and inexonable erosion of capacity of natural environment to support life. In fact, we are now experiencing a period of unpreqedented change as part of the revolution taking place in our world economy and society and this has tremendous impact on our surrounding environment and the life supporting system over this planet.

Of late, the growing concern over the negative environmental impact as a product of recent expansion of population and economic activity has raised important questions about the relationship between the natural environment (life supporting system) and the socio-economic behaviour. Realising the immediate danger of ignoring the environmental issues there has been some kind of new awakening and the new world order has been addressing itself to environmental problems. 'How best one can maintain, upgrade and improve the environment , with judicious utilisation of natural treasure resources for the benefit of the humanity' is a million doller question. This awareness and change taking place in the social life have promoted ecology as one of the main concerns.

Increasing concern for environmental degradation has led to environmental sensitivity among nation-states of developed and developing nations alike and a plethora of environmentalists have mushroomed all over the world. A hallmark of this new awareness is increasing involvement of Governmental and non-governmental agencies at all levels of environmental protection. At the same time ecological initiatives have provided impetus to the formulation of mass organisations, such as popular fronts, and they have begun to mobilize pressure throuh grass-root groups, individuals and community network opposing and challenging many of the world's most ecologically insensitive governments. To some extent this conflict of ecological concern and insensitivity has led to politicization of environmental protection and other ecological issues. In many parts of the world this environmental concern has also given rise to national or regional consciousness due to increasing emphasis on NIMBY (not in may bark yard) concept and rising feeling of environmental colonialism.

As in other spheres, the former Soviet Union witnessed several significant developments in the environmental arena as-well. Even the strong centralised bureaucratic measures and iron curtain of censorsbip could not stop the outbrust of public sentiments on this issue as it was evident in the closing years of 1980s in the USSR. In the Gorbachev period there were environmental protests usually stemming from national opposition groups to what was perceieved as the

dictates of the central ministry, its monopoly over decision making and the resultant mismanagement of resources and pollution.

During this period ecological concern played an important role in stimulating the articulation of demands by the popular fronts and it even became intimately intertwined with the ethnic unrest. Often focussed upon some immediate and localised aggravating problems, ecological issues became the source of nationalistic expression in many erstwhile republics of the Union including Central Asia where environmental issues has been one of the main rallying points for ethnic unrest. The disaster at the Chernobyl nuclear power lant in April 1986 served as a catalyst in generating public awareness of the catastrophic costs of the environmental mishaps. With the expansion of 'Glasnost' former Soviet citizens gained access to information about other forms of environmental degradations. In late 1980s public protests against environmental degradation, from ecolgical platforms as a component of nationalistic assertion and public discussion of adverse health effects became everyday occurrence. As a result of this public activism construction works on some major projects were discontinued, plants were shutdown or altered to accomodate these concerns and planned projects were delayed to allow further environmental assesments. Meanwhile independent environmental groups cropped-up all over the former USSR and a series of public protests resulted in the closure

numerous plants or cancellation of construction of projects on ecological considerations.' Taking the case of Central Asia closing of Vitamin Concentrate Plant in Palvador, (Kazakhastan) or closing of Novo-Kokand phospohate fertilizer plant in Uzbekistan are few highly publicized examples. In several cases this NIMBY concern (growing public resistance in locating the hazardous waste facilities) led to outbrust of nationalistic sentiments. The Soviet centralised command system of economic management left little role for local communities in the decision making process and in economic development programmes. But it were the local communities who had to bear the immediate consequences, such as problems of air pollution, water pollution, radiational waste disposal, land degradation etc. In such a situation where many of the local affected communities comprised predominantly of non-Russian community, the environmental concern generated antagonism against the Soviet central government and the Russian's as a dominent group.

In the Gorbachev period domestic ecological problems in Central Asia began to influence the centre-periphery relations. The Soviet decision of 1986 to abandon the much publicised Siberian River Diversion Project on technical and economic grounds, which would have brought relief to water thirsty vast arid zone in Central Asia, became a new irritant in kindling Central Asian ethnic unrest aganist the Soviet policies. In February 1990 riots took place in the

eastern part of Tadjikistan with the protesters demanding to close down the polluting alluminium plant. Thus one can argue that domestic environmental problems contributed to the process of tension building over regional and politcal issues which in turn, often, appeared to act as a catalyst for environmetal protest and vice versa. The environmental problems were perceived as direct product of the Soviet policy of resource colonisation in Central Asia. Further, the economic and ecological disadvantages were superimposed upon objective cultural differences, as it was outrightly cutting across the ethnonational boundaries in the Soviet Union and it had potential for national protest on ethnic lines. Since the protest revolved around the local and regional problems it led to the 'intertwining' of environmental and ethnic, political and economic issues and on a wider plane with nationality issues. This explains the anti-Soviet and anti-Russian content of the various ethnic unrest and disturbances in Central Asia in rhe recent past.

It is, therefore, important to take stock of actual level of environmental degradation in Central Asia and the role of local environmental movements in fulling up the ethno-national resurgence. Ecological problems today have asumed special urgency and have become the subject of intensive research. Environmental questions are, of course, inter-disciplinary. At the same time, however, many existing research efforts and programmes do not take into account the relationship between ecological and socio-political problems

sufficiently. There are political, ideological and military dimensions associated with the environmental problems, politics and policies. Different facets of environmental protection movements and their potentialities have not been adequatly addressed so far. When research is conducted on matters such as environmental problems particularly in the field of social sciences the implicit concern has generally been as :

> What are the reflections of man-nature interation, how does one views another? How do organisations (governmental and non-governmental) regard the worth of nature, for man and society on a wider plane ? Are and how are, their declared values implemented in daily economic activities? And how the interacting forces indulge in the use and abuse of nature affecting the health and well being of both man and nature?

Any examination of the environmental problems needs to take into account the level of man-nature interaction and the behavioural pattern which resulted into the lack of understanding of the delicate balance between the two (man and nature), and culminated into the higher level of abuse of nature.

This study has taken up environmental problems in Central Asia (the republics of the erst-while Soviet Union), as its subject of research. The issues that have come in for examination are: What is the state of environmental degradation in Central Asia ? And crucially what was the

human behaviour, ideas and attitude in the ex-Soviet union that led to the environmental 'deterioration? It also looks into the Soviet policy towards environment and its socio-economic implications and ultimately the examination of the mode of environmental protection movements that contributed to various regional or national protest movements. Keeping in view, the fact that most of the environmental problems and related issues in Central Asia are identified with the Aral Sea and Amudarya and Syrdarya (the two main feeders of the sea) whcih has been the main source of the water supply to large parts of Central Asia including Kazakhstan, a case-study of Aral Sea crisis has been made.

Chapter one outlines the ecological situation in Central Asia, making a comprehensive analysis of all components of environmetal problems consisting of air and water pollution, soil erosion and mismanagement of solid and chemical wastes in the region that has led to the deterioration of environmental conditions. Chapter two examines the mode of productive sub-systems of the erstwhile Soviet Union. It evaluates the policies and processes that were responsible for the use and abuse of nature that led the local environment to reach a crisis stage. It also examines the centre-periphery relation in the erstwhile Soviet Union and resource utilization, conservation and colonisation as part of Soviet policy.

The extent and pattern of actual crisis in the Aral Sea has been comprehensively discussed in chapter three. Chapter

four shifts the focus from actual environmental problems to environmental concerns and examines the processes by which environmetnal protection became an issue of protest in the ex-USSR. It discusses the participation of public in the environmental protest movements and its blending with the nationality movement. By taking an account of protest movements and ethnic unrest it also examines the linkages between environmentalism and nationalism in Central Asia. The concluding chapter comes out with a comparison of environmental mass movement in Central Asia and the other parts of the world. The cultural division of population in the ex-USSR has given birth to ethono-regional consciousness. It was excentuated by the disparities in the level of environmental problems and NIMBYism.

Comparative regional analysis approach has been followed for studying the environmental crises and politics of the environmental protest in Central Asia - first by looking at the looking at the region as a whole and later by focussing on the particular crisis of the Aral Sea. The study is based on such primary sources as ex-Soviet offical data, records etc. as has been published from time to time in The Current Digest Of The Soviet Press and Soviet Geogrphy etc. These have been supplemented by using secondry information gathered from books and articles of relevance from various other journals.

REPUBLICS OF THE CENTRAL ASIA

CHAPTER-I

THE STATE OF ENVIRONMENT IN CENTRAL ASIA

Disparities in regional development and the pressure of population are polluting the ecosystem and ultimately the quality of human life is adversely affected. Not long ago, natural resources seemed inexhaustible, chimneys full of smoke and open spaces enmeshed in power transmission lines were considered to be symbols of progress and rapid development, something that sincerely gladdened people. But over the past several years some dramatic events have occurred, extraction of natural resources has grown at a headlong pace, chemical industries have introduced unwanted substances into nature on a broad scale and ecological balance has reached a crisis stage. The scale of these problems has expanded from local to global dimensions.

As elswhere, Central Asia too has been subjected to these problems. There are victims of poisoning and there are people who will remain crippled for their entire lives.Vast patches of mutilated land and abandoned villages bear testimony to the intensity of ecological problems in Central Asia. The people of Central Asia also finds that quality of their lives being affected by environment deterioration in one way or the other as a result of noise pollution deteriorating air quality and poisoned water ways. Air pollution causes or aggravates a host of diseases. It is

linked with increased rates of respiratory diseases and eye-disorder. Water pollution has sparked epidemics. Heavy metal, chemical poisoning and noise pollutions lead to various tyepe of nervous disorder. It is difficult to estimate the actual number of lives shortened or burdened with suffering but it is considerably in large numbers. Residents of highly polluted areas show little resitance to diseases. A lrge segment of the Central Asian population is aware of the relationship between illness and poor environmental quality of their surroundings.

Publication of some random reports between 1985 and 1990 on some events in the Central Asian region brought into focus the environmental problems in Central Asia. Reports about an explosion at the Beryllium production factory of Ust-Kamenegorsk nuclear fuel power plant (a subsidiary of the Ulba metallurgical plant production association) in Kazakhstan were made public for the first time. It was the world's first accident at an enterprise of this type, which released hazardous substances into the city's atmosphere. The cloud of dust and gas that formed after the explosion affected the health of more then 120,000 people living in the vicinity of the plant .[1] Semipalatinsk nuclear testing site in Kazakhstan has been in use for the last 40 years during which in

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1. "Nuclear Plant Accident Affected 120,000," *Izvestia*, November 4, 1990, p.2, Translated in *The Current Digest of The Soviet Press*, vol. XLII, n.44, 1990.

open air tests alone nuclear bombs equivalent to 20,000 bombs of the type dropped oh Hiroshima and Nagasaki, were exploded in proximity to hundreds of human settlements.[2]

Similarly ecological situation in the lower reaches of *Amudarya* and *Syrdarya*, in the vicinity of the Aral Sea has assumed alarming proportions. Sand storms in the region have became more frequent and soil has become highly saline. The population uses untreated highly mineralised water from rivers canals for domestic purposes which has led to an increase in the cases of illness.[3] The combined effect of industrial discharges plus drainage of agricultural chemicals and untreated domestic sewage produced an extraordinary incidence of infectious diseases. Infant mortality rates have reached as high as 92 to 118 per 1000 in some areas of Central Asia.[4]

When these reports became public a rash of public protests force the authorities to close numerous such plant. Closing of vitamin concentrate plant in Pavlodar, (Kazakhastan) Novo-Kokand Phosphate Fertiliser Plant (Uzbekistan) and Cancillation of construction of few other

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2. "Nuclear Plant Accident Affected 120,000," *Izvesita*, November 4, 1990, p.2, *Translated in The Current Digest of The Soviet Press*, vol. XLII, n.44, 1990.

3. "Bitter Legacy of Closed Nuclear Test Site," *Izvestia*, October 2, 1990, p.1, *Translated in The Current Digest of The Soviet Press*, vol. XLII, n.40, 1990.

4. "USSR Major Ecological Problems Cited," Pravda, September 7, 1987, p.4, *Translated in The Current Digest of The Soviet Press*, vol. XXXIV, n.36, p.1984.

projects based on ecological concern, are some instances these events apparently ' different in causes and consequences, have much in common. All these cases came as rude surprise to the people and led to mass ecological awareness. Each case involved a complex web of cousality apanning vast geographical area, embracing different environmental ingredients and posing many alternative models of explanation. Cause and effect, in each case, spanned years or decades. Each implied related problems not yet discovered and each incident was one more revelation that Central Asian environment is dangerously degraded.

Two Moscow based geographeres N.L.Chepurko and V.P.Chizhova using a system of 42 natural economic regions categorised the then Soviet Union into zones of ecological stress. [5] The authors calculated the environmental impact on each region according to the population size of the industrial centres. Next, they assertained the industrial structure of each region and evaluated the polluting impact of the specific industries. (chemical, petro-chemical, ferrous and non-ferrous metallurgy, food processing, pulp and paper and so forth) on both water and air. They rated the regions according to environmental stability and the capacity of the natural environment to resist polluting

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5. Ziegler, Charls E., "Environment Policy in the USSR," The University of Massachusetts Press, Amharst, USA, 1987, p.13.

emission and effluents. By this methodology Chepurko and Chizhova divided the 42 regions into four broad zones of ecological stress as very high, high, medium and low.[6] (see table-1)

Of the Central Asian regions the Eastern and Central Kazakhastan and Pavlodar-Ekivastuz are zones of highest stress followed by Central Asian plains, West Uzbekistan and Karatau-Syrdarya, the areas which are suitable for agriculture and are also highly industrialised. In many respects the Central Asian regions' environment is reaching a state of ecological derangement, that the region can not tolerate much longer. This is apparent by examining both the traditional indicators used to assess environmental qauality: air, water and soil, and also newer indicators pointing to the more recently discovered ecological problems like toxic and consumer waste and the effect of radioactivity (radiation).

Rank-ordering of the economic regions of the then USSR, by degree of pollution and environmental degradation clearly indicates that worst environmental condition has been prevailing in the Central Asian region in comparison to the other regions.(see table no.2)

There are couple of ways that one can apporach the environmental problems in Central Asian region, one, by comparing the Central Asian region with other regions of

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6. Ibid., p.14.

Table -1

Rating of Natural Economic Regions by Ecological Stress

Stress Rating	Regions	
I Very high	Donets,	*Central Kazakhastan,*
	Lower Dnieper ,	*Pavlodar-Ekivastuz*
	Upper Ob'	Upper Enesei,
	East Kazakhastan,	Volga-Don
II High	Middle Volga,	Khar'kov,
	Caucacus, Urals,	*Semirech'e,*
	Cisbaikalia,	*Karatau-Syrdarya,*
	West-Kazakhastan,	*Central Asian Plain,*
	Kurosok Magnetic	North Caucasus, Kiev
	Anomaly,	
III Medium	Kama, South-West	North Kzakhstan
	Belorussia,	Leningrad,
	Trans-Urals,	West-Siberia,
	Central Asian	Baltic Moscow, Amur,
	Mountian,	*North Kazakhastan,*
	Transbaikalia	
IV Low	Volga-Viatka,	Western Russia,
	Carpethians,	Dvina-Pechora,
	Upper Volga	North East Pasific,
	Karelia- Murmansk	Iakutia,Lower Enesei

Source: Zigler,Charls E.(n.5), p.14.

Table 2

Rank Ordedring of Economic Regions by Degree of Pollution and Environmental Degradation

Region	Airpollution Per Unit of urbanized	Soilcon tamination and erosion	Pollution rivers and water shortages	Damage to forests	Aggregate human impact
North	2	12	8	2	13
Northwest	10	13	9	7	15
Central	6	10	3	6	4
Volga-Vyatka	15	11	4	18	17
Central Chernozem	9	3	4	14	6
Volga	8	6	1	12	5
North Caucasus	12	6	2	14	9
Urals	1	9	2	3	2
West Siberia	7	14	10	5	16
East Siberia	3	15	11	1	15
Far East	16	15	11	1	15
Donets-Dnieper	5	4	1	4	1
Southwest	11	7	6	15	8
South	17	5	5	17	12
Baltic	18	8	6	9	12
Transcaucasus	15	2	3	10	3
Central Asia	14	2	7	18	14
Kazakhstan	4	4	7	18	14
Belorussia	13	5	5	13	11
Moldavia	20	1	3	16	10

Source: Computed from data in Selskoye, 1988.

the erstwhile Soviet Union, and second, by focussing on the situation prevailing in the particular Central Asian context in all its ingredients.

Air Pollution

Once regarded as mere nuisance, air pollution is now widely acknowledged to have negative effect on human health and environment. The industrial development and related urbanisation led to the drastic escalation of air pollution in one form or the other. Atmospheric pollution is concentrated in the densely populated, urbanised and industrialised areas of the region, mostly where factories, powerplants and automobiles conglomorate. Oxides of Sulphur, Nitrogen and Carbon, as well as dust, cinder and ash and trace metals are charchetristic components commonly found in the gaseous wastes emitted by coal, gas, oil, shale and wood fired powerplants, factories or from vehicles causing air pollution.

The principle sources of atmospheric pollution (besides motor vehicles) are industrial enterprises. Industrial activity contributes to a large extent to all atmospheric pollutants. Stationary sources or more particularly industrial sources in the city accounts for more than half of the total atmospheric pollution.[7] So, industry clearly is the major offender, major sources being the iron and

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7. "Protect Nature," *The Current Digest of The Soviet Press*, vol. XXXV, n.23, 1984,p.22.

steel, grain processing, asphalt and phosphate mineral fertilizer, petro-chemical' and coal cleaning and power plants and in a large measure due to the use of coke in the manufacturing and powerplants. Serious ecological problems arise with the high use of sulphur coal. Trace metals such as arsenic, cadimum, cromium, lead, manganese, mercury, nickel and venedium are also found to impregnate the atmosphere through the emission from the powerplants in the form of exhaust gases, if they are present in the fuel. Despite periodic efforts to hasten conversion to cleaner fuel and to install better emission control devices, these production facilities continue to have disastrous impact on the local environment. Metallurgical factories seem particularly offensive to those unfortunate enough to live nearby. Of the diverse pollutants released into the atmosphere sulfur dia oxide and nitrogen oxide contribute higher percentage of atmospheric pollutants. These are basic 'nuts and bolts' type of pollutants and are indicative of higher combustion of such dirty fuels as lignite (sulphur coal) and oil shale, mainly used in the thermal powerplants, making them more offensive. Powerplants generate over half of the total sulphur dia oxide emissions in urban areas and a significant volume of sulphur and nitrogen oxide are also added by urban automotive transport. Coking by-product plant and sintering mill also inject high dose of sulphur dia oxide into the atmosphere through emitting gases. The boilers for the local heat

and power stations and heating system of some enterprises one another source of worry as they burn high ash coal.

Because of the rich mineral base with heavy industries and mining operations Kuzbas (Kuznetask basis in northern Kazakhastan) has become one of the major production centres of the region (Central Asia).[8] In the last three decades chemicals, food processing, metal fabrication and many more industries have been added to this industrial base, while the region has retained a significant percentage of medium and light industries. Coal from Kuzabas deposits (in Kazakhstan) are relatively low in sulphur content, but they have high ash (around 40 percent) and moisture (between 8 to 12 percent) content and consequently only moderate calorific values.[9] Their use also presents fromidable dust trapping and solid waste disposal problems. Air in this area has also been oppressed by injection of carbon-mono-oxide and other pollutants from stationary and industrial sources.

Temirtau a satelite of Karaganda in Kazakhastan was ranked in 1988 second among the five worst hit cities of the ex-Soviet Union, in respect of air pollution. [10] Although automobile pollution was less than 10 percent of the total pollutants, stationary sources and industrial

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8. Symons, Leslie (ed.), "The Soviet Union, A Systematic Geography," Hodder and Stoughton, London, 1983, p.245.

9. Ibid., p.146.

10. "Panel on the State of the Soviet Environment at the Start of the Ninties," Soviet Geography, vol. XXXI, n.6, 1990.

sources of pollutant dominated this city. Being an iron smelting centre, Osh town of Kyrgyzistan ranked next.[11] In several other cities in the inter-mountain basins, having diverse types of activities dust and soots are pushed into the air, leading to atmospheric pollution. (See Table No.3)

If we turn to the sulphur-dia-oxide concentration, Gur'yev, in North Western Kazakhastan is worst affected.[12] The main sources of pollution here appear to be oil refining and chemical production. It had sulphur-dia-oxide level in 1988, at least four times the MPC (minimum permissible concentrate).[13] Leninogorask in the east of Kazakhstan, site of a major lead-zink processing operation, adds Nitrogen Oxide into the air and these production facilities contiune to have disastrous impact on the surrounding environment.[14] Because of the emission from the *Electro Khimprom* (elctro-chemical industry) the pollution of the atmosphere from dust, sulphur-dia-oxide, nitrogen-oxide and ammonia in the city of Chirchik and the surrounding areas, including the north eastern section of Tashkent has remained above the allowable level.[15]

Recently strip mining of low grade coal has been

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11. Ibid.

12. Ibid.

13. Ibid.

14. Ibid.

15. "Chemical Abuses," *The Current Digest of The Soviet Press*, vol. XXXIX, n. 36, 1987, p.6.

Table -3
Comparative Air Pollution indices by Union Republic

Republic	Pollution in Tons Per capita Per year	Per km2 Per year
Estonia	0.67	41.0
'Kazakhstan	0.59	4.7
RSFSR	0.41	6.0
Ukraine	0.36	31.1
Turkmenia	0.31	4.8
Belorussia	0.21	10.6
Moldavia	0.20	24.0
Lithunia	0.19	10.6
Azerbaidzhan	0.17	12.6
Georgia	0.14	14.2
Uzbesistan	0.12	4.8
Latvia	0.12	4.7
Armenia	0.10	23.9
kirgizia	0.08	1.8
Tadzhikistan	0.05	3.0
USSR ave:	0.36	6.9

Source : Adapted from 'Local problems...,' *Environmental policy Review*, June 1987, p.25.

expanded in Ekibastuz basin of Kazakhstan to be used primarly for domestic electricity generation.[16] It had become more important as the coal deposits in the industrialized areas of the ex-Soviet Union were depleting fast or had become inaccessible, incurring more pressure on Ekibastuz coal. Strip mining in Ekibastuz and use of low grade coal will add significantly to air pollution until effective scrubbers are not installed to reduce sulphur and ash emission.

Motor vehicles are the main source of air pollution in Alma Ata the capital city of Kazakhstan. They contribute about 80 percent of the harmful substances found in the air.[17] Air samples from Alma Ata indicate the presence of dust, sulphur-dia-oxide, carbon-mono-oxide and Nitrogen oxide and once in a while Nitrogen smoge over the sky. According to the data of the Kazakhstan Department of Hydrometeorology and Environment, on certain days and at certain places the dust and carbon-mono-oxide level even exceeds the permissible limit.

Industrial enterprises are still a strong source of atmospheric pollution. The huge plants and factories that have formed a part of the central city were not all adequately equipped with treatment and filter facilities. The situation was particularly bad at enterprises under the

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16. Symons Leslie (ed.), n.8, p.146.

17. "Air over Alma Ata," *The Current Digest of The Soviet Press*, vol. XXXV, n.24, 1984, p.23.

control of Union ministries. At the city's (Alma Ata) largest enterprise, the Alma Ata heavy machinery plant, accounting for a third of total air pollution, operates without devices for trapping gasses and dust, while at the Pristron plant the corresponding figure was more than one fourth and at the 20th Anniversary of October Mashin Tool plant it was stated to be about half.[18]

Many power stations and enterprises in the metallurgical, chemical, petro-chemical, coal and building material industries continue to pollute the air mainly because pollution abatement equipment, gas scrubbers and dust trappers at industrial enterprises were ineffective or were not operating properly. Often poor use was made of the anti-pollution equipment that had already been installed. It was found inoperational at household chemical production plant in Alma Ata. More than third of the installations were out of order at *Asfaltobetan* (Asphalt concentrate plant) and at a plant that supplies boiler associated equipment and heat pipe system.[19] There were still other enterprises that had done nothing about installing systems to reduce wasteful discharges. The number of industrial installations without pollution control equipment is great. Low waste and waste free technological processes were being developed at extremely slow pace and there was virtually no

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18. Ibid.

19. Ibid.

economic interest in environmental protection activity. Too often, departmental interest was being put above the interest of people and environment and that led to catastrophic consequences. Back in 1972, the CPSU central committee and government authorised the USSR ministry of power and electrification to design an installation for scrubbing sulphur dia oxide from fume gases. However, that resolution was never fulfilled.[20]

It must also be noted that the central industrial regions specially Moscow have received 'preferential treatment' from Soviet officials, anxious to offer it as a show-case of environmental action. On the other hand Central Asian region remained largely neglected on this account.

Health risk from air pollution is an issue which is receiving much more attention in the region. It is now common knowledge that air pollution feeds the incidents of chornic disease like emphysema, bronchitis, hart-failure and cancer (See Table No. 4) Other air born pollutants have been linked to pollution induced illness especially in the case of workers whose daily routine exposed them to commonly used substances which are cancerogenic. People now know that air pollution is a threat to their health, because they can see their neighbours and children getting sick from it. The growing awareness of health issues has turned into

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20. Ibid.

Table-4

Air pollution its effects

Air Pollutant	Typical Source	Effects
Sulphur dioxide	Power houses, sulphuric acid plants, petroleum industry, oil refining, and domestic use of fuel	On Human beings: Suffocation, irritaion of throat and eyes, respiratory diseases. On vegetation: Destruction of sensitive crops and reduced yield.
Hydrogen sulphide	Viscose rayon Plants, petroleum industry, sewage treatment, tanning industry, dye manfacture, oil refining	On Human beings: Irritation of respiratory passages, danger of respiratory paralysis and asphyxiation On Property: Darkening of painted surfaces, corrosion
Nitrogen dioxide	Acid manufacture, automobile exhaust, explosives industry	On human beings: Irritation, bronchitis, oedema of lungs.
Hydrogen fluoride	Fertiliser, chemical and aluminium industries	On human beings: Irritation, diseases of bone (fluorosis) mottling of teeth, respiratory disease On vegetation: Destruction of crops On animals: fluorosis in cattle grazing on contaminated vegetation
Carcinogenic hydrocarbons	Organic chemical industry, vehicular traffic, specially automobiles	On human beings Cancer
Dust	Mines and quarries, pottery and ceramic factory stacks, and power stations	On human beings: Respiratory diseases like silicosis, asbestosis etc. from metallic dusts On property: Soiling effect and corrosion
Carbon monoxide	Fuel gases, exhaust emissions from automobiles, mines, blas furnaces	On human beings: Poisoning, increased accident libility

Table-4 Contd.

Oxidants	Photo-chemical products from the organic materials irradiated in the presence of nitrogen dioxide, by silent electric discharge and by intense ultraviolet radiations	On human beings: Lung irritation On vegetation: Destruction of vegetation On property: Deterioration of rubber products such as tyres, insulating wires, etc. In general smog formation is due to interaction on ozone (formed photochemically and olefins (from autoexhaust and certain industries) in the atmosphere. Smog fromation is not extensive in tropical countries like India.

protest and has even been successful in closure of some such plants which were found to be directly responsible for air pollution. Still there is a great deal that remains in dark. It is clear that in Central Asia air pollution is a major problem and it has profound implications for health, economic well being and overall quality human life and of the natural surroundings.

Water Pollution

Adequate water resources are crucial for development of industry, transportation, farming and urban life. Any future growth gets severely limited by an insufficient supply of relatively clean water and general quality of life suffers accordingly. But water pollution is universal in the region affecting upto 90 percent of water. Water pollution poses such a health problem that most water used for human consumption must be treated throughly before it is safe to drink. Thus the conservation of water resources remains one of the most acute and most vulnerable problems. The problem is most serious and intensive in industrialized parts of Kazakhstan. The extensive agricultural areas of rest of the region are hit by runoff affect of chemcial fertilizers and salinisation from irrigation projects. Rapid industrialisation and agricultural development since 1930s resulted in the slow but inexorable process of polluting streams, rivers and seas which has now assumed a dimension of regional tragedy.

The vexing problem closely linked with the availablity of adequate water supply is that millions of cubic meters of water are polluted each year. Water use in agricultural for irrigation is an especially acute problem since it consumes three times as much water as industry. But while industry returns two third of the used water to streams and rivers (water presumably recoverable through proper treatment), four-fifth of the water diverted for agricultural use and irrigation is lost through seepage and evaporation. Only about half of water from rivers and streams tapped for irrigation ever reaches the fields, and only fifty percent of that is ever recovered for furture use.

Major sources of water pollution in Central Asiaare industry, agriculture and municipal communities. Well over half of the volume of the industrial waste comes from the enterprises of food processing leather and organic chemicals. Industries use water in their productive activities and discharge oxygen gulping waste back into the water supply. Large amounts of industrial waste are also dischrged without treatment into the municipal sewer system or directly into rivers and streams. Industrial waste water, in addition to its biological oxygen demand (BOD) content, often harbours toxic materials such as cadimum and mercury. Many other toxic metals are discharged as well, with little regard to their potential danger to environment and human life.

Spectacular growth of pesticides industry in the region during past two decades has its associated problems in the safe disposal of waste water generated in the manufacturing plants. Some pesticides such as Phosalone Diazinon are highly toxic and requires extensive treatment before being discharged into the environment. Due to sheer negligence large quantities of pesticides got accumulated in the regional water bodies making the same hazardous for human health and the natural environment as a whole. Agriculture is the second major source of water pollution in Central Asia. Population growth in the region meant more crops and thus more pollution. Crop production has relied heavily on the use of chemical fertilizers. Nitrate and Phosphorous based fertilizers take heavy toll of water quality. Besides pesticides and herbicides play insidious role in water pollution, since the runoff from the treated areas carries a residue of the poisonous metals, chlorinated hydrocarbons and oxygen phosphates on which these compounds are based. Much of these wash away into rivers and streams or leach into substranian water supplies. This leads to the a problem of salininsation on extensively irrigated land, with high salt contents. Pesticides and herbicides have raised the agricultural productivity, but have also entered the water system in substantial amount. Pesticides such as DDT may be cancerogenic and mutagenic that is harmful to man along with all other living organisms.

Domestic and industrial sewage also constitute a major threat to regional water bodies as only few cities have proper waste water treatment facilities and large amount of waste is discharged without treatment. The level of pollution of surface and subsurface water by industrial wastes from the chemical plants and chromium compounds plants in the Aktyubinsk industrial area (in Kazakhastan) is increasing year by year. Situation in this area is such that people there have no guaranteed drinking water supply.[21] The state of affairs is also bad in Dzhambul and Chimkent provinces where large enterprises for the production of Phosphorous and mineral fertilizers are located.[22]

Thermal pollution is also counted as an industry related hazard to water. This problem is acute around thermal power stations, which frequently discharge water directly from their boilers. It is likely to become increasingly severe in future since greater volume of water will be required for cooling purposes. Open-pit mining opperations also represent a hazard to nearby streams and rivers. Mine wastes constitute the most serious water problem in heavely mined areas of Kazakhstan.

For the Central Asian region as a whole, the story of water pollution is best told in terms of the fate of major

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21. "Taste of Amudarya Water," *The Current Digest of The Soviet Press*, vol. XXXVII, n.28, 1985, p.9.

22. Ibid.

regional water-ways. Virtually all the rivers and the inland sea(Aral) is dotted with numerous sources of industrial and domestic affluents and pollutants from many more other sources (see Table no.5).

The loss of water from Aral sea also has far-reaching impact on Central Asia. Water level in this inland sea has dropped due to extensive withdrawals for agricultural use and if the present trend continues, it will be a dry salt marsh by the year 2000 A.D. This water loss has not only disrupted fish breeding areas of the sea but has also virtually destroyed the local fishing industry. The fishing industry which sustained on the Aral Sea, has been a major victim of deteriorating water quality. The sight of dead fish in major water ways became a common phenomenon. Fishermen are deprived by spectacular fish kills as a ressult of industrial and agricultural poisonous wastes or by their indirect destruction as breeding grounds are ruined. The fish have not been the only victim of water pollution. The ability of Aral sea water to dilute the salt and increasing load of industrial domestic and agricultural affluents which flow annually from cities and farming area along its feeders, has got depleted.

In recent years environmentalists and naturalists have also noted spreading algae growth, on stagnant rivers and reservoirs. Algae growth has also caused numerous health problems including infectious diseases and allergic reactions.

Table-5
Results of Public Health Test of Centralized Water Supply systems by Union Republic, 1988

Republic	Number of tests, inorganic substances	Preeentage not satisfying public health norms	Number of tests, bacterial content	Percentage not saillsfying public health norms
USSR	1,288,734	18.4	3,137,110	11.3
RSFSR	689,497	20.5	1,937,861	11.7
Ukrainian SSR	254,639	13.1	386,169	9.9
Belorussian SSR	38,822	29.5	146,857	9.0
Uzbek SSR	34,021	25.9	127,819	14.7
Kazakh SSR	72,171	12.7	197,082	7.4
Georgian SSR	53,263	7.9	63,428	14.7
Azerbaijan SSR	34,522	31.4	37,301	21.8
Lithunian SSR	12,904	22.3	64,322	5.1
Moldavain SSR	15,758	14.5	27,243	8.6
Latvian SSR	17,113	13.4	21,573	8.1
Kirghiz SSR	22,339	3.7	34,547	14.1
Tadzhik SSR	9,952	21.5	17,943	21.7
Armenian SSR	15,702	5.3	32,382	10.9
Turkmen SSR	8,795	27.5	16,939	23.4
Estonian SSR	9,26	12.2	25,644	13.6

Source: Abstracted from Okhrana, 1989, p.36.

The direct impact of water pollution on man quickly becomes apparent due to health problems. Soviet health officials admitted that health complaints had been widesperad and most often linked to contamination of drinking water sources in Central Asia. Rapid industrialization and urbanisation have accounted for the water crisis of high magnitude, the ramification of which started to penetrate official and public consciousness only in 1980s. Both the quality and quantity of fresh water in the Central Asian region is dimnising rapidly. The main agents of this deterioration has been industrial sludge and affluents, untreated sewage, pesticides and chemical fertilizers.

Soil Degradation

In recent years soil degradation in Central Asian regions has caused great concern among many environmentalists. The process of soil erosion are initialed by misuse of land by man after removal of the protective cover of the natural vegetation. The formation of a mature soil may take many thousands of years. Yet, it may be torn away right down to the parent-rock material within a short time by erosions. Agriculture, the chief cause of erosion itself gets seriously affected by soil erosion. Other branches of economy are usually also damaged by it. Soil has lost its capacity to yield a harvest in many parts of the

world as a result of man's stupid irresponsible economic activity .

The soil of the semi-arid and arid zones of the ex-USSR particularly from Central Asia are quite productive. The high summer temperature and long growing seasons of these areas make them ideal for cotton and other subtropical crops. Irrigation is, however, necessary for improved and constanly high production and productivity. But irrigation brings its own problems in soil management. Irrigation practices on such soils can improve or impair their usefulness as crop soils. In this region problems of salt accumulations are commonly encountered, produced by the evaporation of saline groundwater at the soil surface. It damages the crop and retards crop productivity.

The practice of irrigated cropping in the last thirty years have rendered barren fields that were quite fruitful up to few years ago. 'No matter where you look, they are empty today and look as if they were covered with snow.'[23] The reservoirs and canals bed in the region were not prepared to receive water. They were not properly lined. It led to the seepage of water through the sandy bottom, which fed into the heavily mineralised ground water. It ultimately caused rise in the ground water, closer and closer to the surface. Rise in the ground water level brought salt (white poison) with it through capilary action. Today there lies

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23. "White Poison," *The Current Digest of The Soviet Press* vol. XXXVII, n.32, 1985 p.10.

thousands of hectares of land, in Central Asia, mutilated by white poison. Excess irrigation also raises water table, that leads to soil damage through water logging. Agricultural fields in the vacinity of Karakum canal are infested with the problem of water logging. On the other hand there are no dependent collection drainage network (places to drain the water that has been used on the fields) in the Central Asian region. Thus the runoff from the fields combined with the ground water. This facilitated the desertification of land even more, in the form of man made salt marshes and secondary salinisation of the soil. Nearly two third of the irrigated areas in Turkmenistan are now subjected to secondary salinisation. Vast tracts of land in Kazakhstan has also experienced anthropogenic desertificaion.[24] (See Table no.6)

Wind erosion and deflection of the soil is also common in the arid region of Central Asia where the soil is light textured. The strong dry winds *Sukhovey* which affect the open plains create formidable dust stroms and 'dust bowl' conditions. Strong winds carry away the upper layer of the soil, killing crops by blowing them aways or by burying them under dust. The dust accumulation on fields or on sources of fresh water is also common is Central Asia. Khrushchev's decision to plough larger areas of the virgin lands of Kazkakhstan, which took effect from 1954, resulted in

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24 Ibid

Table 6

Proportions of Total Cultivated Area Affected by Erosion,Salinization, Increasing Acidity, and wateriogging by Union Republic, 1985 (in percent)

Republic	Affected by salinization	Affected increasing acidity	Affected by water logging	Affected by deflation	Affected by water erosion
USSR	4.9	22.8	1.6	40.8	18.0
RSFSR	1.9	32.4	1.2	32.9	19.7
Ukrainian SSR	2.6	13.1	2.5	50.2	28.9
Belorussian SSR	-	43.0	10.1	43.5	6.3
Uzbek SSR	36.4	-	1.4	4.1	10.4
Kazakh SSR	13.0	-	0.3	73.2	4.6
Georgian SSR	4.5	8.8	0.8	0.8	3.5
Azerbaijan SSR	17.0	0.8	-	0.1	4.7
Lithuanian SSR	-	27.0	4.1	56.5	14.9
Moldavian SSR	0.8	-	0.3	27.8	24.8
Latvian SSR	-	18.1	8.1	5.0	16.3
Kirghiz SSR	16.1	-	0.2	37.2	42.0
Tadzhiz SSR	9.2	-	-	-	16.6
Armenian SSR	4.1	0.1	0.2	-	23.1
Turkmen SSR	97.8	-	-	-	-
Estonian SSR	-	16.4	3.5	6.1	5.5

Sources: Computed from data in Selskoye, 1988, pp. 50-51 and Okhrana, 1989, p.94.

frequent and destructive dust storms in those areas.

The problem of soil loss through gulling is also present in Kazakhstan and Central Asia. Freely moving water develop branching systems and their coalescence removes the entire soil cover including humus, nutrients and micro-organisms so that a waste land is produced. The published data indicate the extensive erosion and degradatin of soil in the region.

Mining operations have also caused extensive soil degradation in the region. Virtually all coal mined in Central Asia region is surface mined. Surface mining has repidly replaced underground mining becasue it is cheaper, more efficient, more profitable and less labour intensive, however, surface mining is environmentally catastophic. It has rendered million of acres of land wercked and revaged waste.

Solid and Chemical Wastes

Owing to the rapid population growth, urbanisation and industrialization the volume and intensity of solid and chemical waste has considerably increased. It has become serious pollution threat to the region. The increasing demand for basic organic chemicals has led to an expansion in their quantity and diversity. A major consequence of this expansion is a greater threat to the locala environment due to the wastes discharged and increase in the introduction of toxic chemcials. Major errors have been

permitted in the region in the establishment of safe chemical systems and in setting adequate safety standards for their use. This has led to broad development of some types of chemical products that are toxic to man and nature. There has been concentration of an intolerably large number of very dangerous chemicals and technologies in agriculture and industry. As a result chemical efects have had negative consequences for local population and nature.

Most hazardous and toxic substances are an inheritance of the chemical revolution that followed 1960s. The creation (manufacture) and use (application) of synthetic chemicals has continued at a prolific pace. Underestimation of the danger of over developing chlorine plants has had a severe negative impact. The danger of chlorine production for man and nature is determined not only by the high chlorine toxicity of products but also from products produced in large volumes such as hexachloran, polychloreyelodienes etc. It turns out into polychlorinated polychloryclodienes (a group of toxic chemicals including the polychlorinated biphenyl - PCBs), such as doxin, which are formed as impurities in many processes using elemental chlorine and chlorinated substances, and have much greater long term consequences.

A number of sources of these foreign substances as wel as the sharp increase in the risk of poisoning man and nature with the accumulation of polychlorinated polycyelics in the environment, have forced industrially developed

countries to create specific remedial programmes. Of the major users of chlorine products only the ex-USSR had not placed the problem of foreign substances such as a polychlorinated polycyclic within the framework of its national programme. The worsening medical, health and ecological situation in Central Asian cotton growing region and the stressed state of the ecosystem of the Aral Sea and many more water bodies are a direct result of the understimation of negative effect of chlorine products and of plants discharging polychlorinated polycyclic into nature.[25] For the past one decade Uzbekistan alone has used about 6,000 tons per year (in terms of active ingredients) of chlorine pesticides that are prohibited in other countries.[26] Wide-spread use of propanyl herbicide is made in the rice growing areas of the region which is also prohibited in many countries as it contains highly dangerous polychlorazobenzones. Large quantities of polychlorvinyl are also used which remains unmonitored (unchecked). In the last few years, efforts to reduce the toxic effect of chlorine plants and their products and wastes on the public and on the environmental were stepped up though gradually. Further accumulation of such substances as polychlorinated polycyclics in the

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25. "Look Back in Alarm," Pravda, August 4, 1988, p.2, Translated in *The Current Digest of The Soviet Press*, vol. VL, n.31, 1988, p.22.

26. Ibid.

environment would lead to unprecedented consequences.

Colour is a visible pollutant. Textiles, dyer manufacturing, tanneries and a host of many other industries discharge coloured waste waters in the regional water bodies. Colour acquired by rivers through the discharge of coloured industrial affluents inhibits the growth of desirable aquatic biota and reduces the reaeration capacity of river water and has tendency to create metal ions. Dyes have also been confirmed as heavy metal carriers. The growth of the textile industry and tanneries in the Central Asian region has also generated enormously large quantities of dye coloured waste water with its negative effects.

Lead is another discharge into the regional water bodies from many industries, such as organic and inorganic chemicals, petrochemicals, fertilizers, basic steel works, founderies and basic nonferous metal works. The possible toxic effects of lead on human beings and animals include gastrointestinal disturbances, loss of appetite, anaemea and nervous paralysis etc. chlorine-lead poisoning has also been also responsible for mental retardation. Meta-Dinitrobenzene (DMB) is an important organic chemical which finds application in leather, chemical and many other industries. DNB discharge has also contaminated the regional water bodies with its dreaded effect on both terrestrial and aquatic life. Herbicides such as the commonly used 24-D, were also enployed for weed and brush controls in USSR. A common Soviet perbicites, called 'butifos', was used to

dufoliate cotton fields in Central Asian region in large quantities. These chemicals generally represent equally dangerous hazards.(See Table no.7).

Sewage is generally pumped out and dumped or drained in an uncontrolled manner, causing grave pollution of land, water and atmosphere. To lessen the deleterious effect of raw sewage on life and surroundings, a suitable treatment prior to its disposal is generally recommended. But there were neither sewage treatment plants in adequate number nor they were effective in the region, primarily due to departmental negligance, leading to serious environmental problems in the Central Asia.

Economic growth has not only resulted in the proliferation of industrial solid wastes but also the problem of disposal of manufactured goods after their productive life has ended. Urbanisation and industrialisation have created these and other human wastes into the sprawling urban centres creating several local problems. Toxic and hazardous substances and chemicals contaminate every environmental medium in the Central Asian region. Most environmentalists apparently believe that air, water and earth are suffused with real or potential toxic menaces. These are materials which either because of high level of radio-activity or toxicity can not be disposed off safely at conventional waste disposal sites such as land fills. They are a growing component of the wastes produced by an industrialised society. Furthermore the last 30 years

Table 7

Health Effects of Regulated Pollutants

Pollutant	Health concern
Criteria pollutants	
Particulate matter	Eye and throat irritation, bronchitis, lung damage, impaired vision.
Carbon monoxide	Impaired ability of blood to carry oxygen, effects on cardiovascular, nervous, and pulmonary systems
Sulfur dioxide	Respiratory tract problems, permanent harm to lung tissue
Lead	Retardation and brain damage, especially in children
Nitrogen dioxide	Respiratory illness and lung damage
Hazardous air pollutants	
Asbestos	A variety of lung diseases, particularly lung cancer
Beryllium	Primary lung disease, effects on liver, spleen kidneys, and lymph glands
Mercury	Effects on several areas of the brain, as well as the kidneys and bowels
Vinyl chloride	Lung and liver cancer
Arsenic	Cancer
Radionuclides	Cancer
Benzene	Leukemia
coke oven emissions	Respiratory cancer

Source: Environmental Protection Agency, Environmental Progress and Challenges: EPA Update (Washington, D.C.: Environmental Protection Agency, 1988), 13.

in the ex-USSR have been both the rapid expansion of nuclear power generation and a 'chemicalisation' programme designed to modernise the Soviet economy. It produced the problem of proper handling and disposal of increasingly ubiquitous toxic materials.

Taking only agriculture as a reference point, the fields and pasture lands in Central Asia have been contaminated by 150 kinds of pesticides, poisonous chemicals and trace elements.

It is difficult to draw a line between the concept of 'air and water pollutants' and 'toxic wastes.' It is often a matter of degree of concentration. Among most common types of toxic wastes that pollute every medium of environment in Central Asia can be listed as numerous industrial chemicals, harmful metals, airborn contaminants, low level radioactive materials, pesticides, house-hold toxic wastes and various residuals from municipal trash dumps, waste water treatment plants and other form of waste disposal. One can safely say that 'everything is connected with everything else,' so far as the local environment is concerned.

Chapter - II

SOVIET POLICY TOWARDS CENTRAL ASIAN ENVIRONMENT

The continuing scientific and technological innovations and unchallenged success of industrialisation have created environmental problems by inducing new substances or technologies with polluting effect and serious environmental risk that can no longer be ignored. At the same time economic growth and population explosion often minimise the effectiveness of pollution control measures.

The abundance of evidence of ecosystem deterioration, from the whole of Russia in general and Central Asia in particular, indicates that economic and social systems of 20th century industrialised and urbanised Soviet Union had reached a point that has been upsetting the balance of nature. Until recently a balance in all components of environment was maintained by the ability of the ecosystem to maintain its equilibrium. This situation changed in the past 25 years or so, and environmental problems have reached a crisis stage. No simple explanation for the continuing regional environmental problems will suffice. Most ecological ills are product of several individual factors which often interact together. In short, almost every significant environmental problem is fixed in a matrix of ecological, socio-economic, political and scientific causes and have such consequences that usually frustrate quick and

simple solutions. It is, therefore, necessary to look into the question from the point of view of man's relationship with natural environment in the former Soviet system. Intricacies of basic elements of socio-economic behaviour and the political anatomy of environmental protection, the effectiveness of the political and economic system in developing a viable environmental protection programme are also worth examining.

Exploitative Attitude Towards Nature

The indifferent attitude in the ex-Soviet Union, of both the elites and masses towards man's relationship with nature and pressing desire to enjoy the consumer benefits of industrialisation are the prime cause of fastly deteriorating environmental balance in the region. Natural environment was perceived as infinitely renewable and thus in ex-USSR resources were being exploited. Environmemt has been manipulated to fulfil the present biological, social or aesthetic needs with minimum attention to its future consequences. The same attitude towards nature has consistently emphasized a need to transform or modify (distort) nature's handiwork with absolutely no consideration to its impact on the environment.

The Soviet bureaucratic culture, and to some extent the general belief about the inexaustable resources of the vast country like USSR led to neglect of environmental issues.

Preoccupation with the ex-Soviet Union's enormous physical size, natural wealth, and diversity generated an attitude that treated the nature's wealth in superlatives, and induced complacency towards resource depletion and pollution. For many people, it was difficult to believe that the Soviet natural resources could be seriously depleted. This attitude got shattered with negative consequences of severe environmental deterioration. There was no real incentive to preserve natural resources and environment. Since many primary materials ware provided free of charge or even 'below scarcity costs' by the State, it created a built-in machanism for firms to waste valuable resources. This appears to be part of a larger problem in the ex-USSR, when the general attitude was not to preserve resources as a social property but to exploit the same. It is infact a byproduct of the view that 'natural wealth is virtually in-exhaustable and it is man's fate to conquer and reshape nature, basically an idea of 'environmental colonisation.'[1] This exploitative attitude towards nature was responsible for depletion of many scarce resources and severe pollution of even water and air.

Furthermore, only one organisation, the communist party, was ultimately responsible for securing progress.Soviet leaders frequently attempted to legitimise

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1. Kelley, Stunkel and Wescott, *The Economic Super Powers and the Environment* (San Fransisco : WH Freeman and Company, 1976), p.135.

their authority by fostering political myths of 'commitment to remould the earth radically for the benefit of the masses' and a will to transform the nature coupled with a vehment denial of 'natural control.'[2] Thereby party established itself as the primary mediator between environment and the society. Value of the natural environment was totally ignored in the compaign to tansform Soviet Union into a modern industrial society.

The concentration of power in the hands of a small elite committed to rapid economic growth shaped the pattern of national priorities that were inhospitable to the ecological frame of reference. Soviet pre-occupation with completing projects within the least possible time is another factor which caused problems for natural environment in Central Asia. completing a task on or below a deadline was rewarded through the bonus system. On the other hand failure to complete one's assigned task on time usually meant forfeiting bonuses, which accounted for one third or more of an individual's income. One consequence of such deadlines, in the given ubiquitous supply bottlenecks' in the Soviet economy, was the phenomenon of 'storming' (*Shturmovishchina*) producing at break-neck speed during the final phases of the plan to complete the quota on time. In this connection the environmental impact of the rushed

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2. Ziegler Charles E., *Environmental Policy in the USSR* (Amherst, USA : The University of Massachusetts Press, 1987), p.28.

project was frequently overlooked. The long term effect on the environment of industrial or agricultural activities were seldom calculated when planners were working under time constraints. One good example of this was Khruschev's 'Virgin Land Project,' to bring vast tracts of land in Kazakhstan under cultivation.[3] Whereas this campaign to bring millions of hectares of previously untilled Kazakh land under cultivation did ultimately increase Soviet agricultural production but there were unforseen environmental consequences. A decade after the 'Virgin Land Project' was initiated, massive windstorm swept inches of valuable top soil from the flat Kazakh Steppes, and deposited it hundreds of kilometers away to the West.[4] Furthermore, cultivation of these arid areas increased the need for irrigation, which raised the demand for scarce water resources. It ultimately resulted in increased soil salinity and the careless farming practice rendered millions of acres of land useless for agriculture. The Soviet curbs on any critical and public discussion on, once a final decision was taken, maintained to preserve the legitmacy of the party rule. This was potentially quite harmful when major projects in transforming nature, were involved . By proscribing criticism and reappraisal of

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3. Symons, Leslie, (ed.), *The Soviet Union, A Systematic Geography* (London : Hodder and Stoughton , 1983), p.69.

4. Ibid., p.70.

overall plan and project the planners were denied the opportunity of access to valuable feedback. Thus the effects of environmental degradation or resource depletion were not apparent until the crisis proportions were reached.

On the other hand praises for accomplishment in transforming nature in the name of betterment of the society were confered upon the party. Conversely blame for environmental disaster, at least man made ones, may likewise be attributed to party leadership. But the party glossed over such failure, blaming them on lower level officials. The bureaucratic pheonenon of 'departmentalism' simply suppressed information about ecological blunders.

This bureaucratic compartmentalism is equally to be blamed for the existing state of the environment. While as shortsightedness in planning procedure has created, what has become a major environmental disaster, bureaucratisation frustrated simple solution of many such environmental problems.

Though there haves been major changes in the offical Soviet attitude towards environment since the death of Stalin, certain fundamental prceptions of environmental use and protection have remained essentially the same. The basic economic structure during the industrialization drive of 1930s underwent only minor modifications through the Khruschev and Brezhnev eras.[5] Although open debate on the necessity of major economic reforms took place since the

early 1980s, the results of the 27th party congress in 1986, suggest that even Gorbachev was willing to do little more than tinker with the central planning system on this score. The prevaling official image of the environment remained fairly the same between Stalin and post-Stalin era.

Diminishing supplies of clean water combined with growing threat to public health from polluted water supplies and many more similar problems led to the adoption of a serious environmental programme.[6] The past two decades have witnessed a diversity of political forces debating environmental issues. Large number of decrees and resolutions on environmental protection were passed during this period but their implementation was tardy.

In the Soviet context ecological concern was generally conceived in terms of two relatively distinct categories. On the one hand, it was environmental protection proper, meaning,to make efforts to reduce pollution and limit damage to natural environment. On the other was, 'rational utlisation of natural resources' which amounted to greater efforts to reduce wastes. By far many economists and technical experts had identified improved use of productive waste (secondary raw materials) and introudction of low waste and waste free production methods, as the key linkage

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5. Ziegler, n.2, p.37.

6. Ibid., p.57.

between pollution control and rational utilisation of natural resources. Reducing waste products during production process minimises environmental damage (by reducing emissioins and lessening the scope of its intrusion into natural reserves) and by improving production efficiency.

This dual strategy of recycling waste and introducing 'ecological friendly' technological processes thus offered an optimum solution to this problem, since it makes pollution control economically rational. In principle, such an approach was supported by the political leadership and received confirmation in economic reform documents. By the 1970s national party and government organisations started taking decisions an related issues and environmental protection was then brought to the institutional agenda.[7] activities. But legislations were primarily addressed to the problems of conservation rather than environmental protection, and even laws tended to be 'conservationist' in character. Infact they were aimed primarily at more complete and efficient exploitation of the Union's natural resources rather than perservation for preservation's sake. However, realisation of this goal was hindered by traditional bottlenecks (insufficient capacity for technological innovations, personnel shortage and departmental barriers).

Since 1975, five year and one year plans, have been

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7. Ibid., n.2, p.83.

containing sections on environmental protection and rational resource utilisation.[8] Targets have also been fixed at enterprises level, however, enterprises had not been given full financial responsibility to impliment these project. On the otherhand enterprises were coninuously susbjected to two conflicting demands, one, increasing production and the other to take measures to protect environment. At the same time there was a tendency to defer the 'environmental cost' of production as long as possible. Ultimately nothing could be done for internalising the cost of environmental deterioration in the overall cost of production.

Escapist View

The Soviets retained a tendency to view the pollution of bodies of water, air and larger environmental quality as some kind of cost of development and justified it by growth of industrial and agricultural production. However, it inflicted termendous losses on the economy and caused great harm to environment. The fact of Tiger Gulch, the worlds only Central Asian sub-tropical forest, is the product of environmental colonisation for 'White Gold' and can only be justified by the escapist view of environment. In 1970 the area of Tiger Gulch was slightly more than 52,000 hactares,

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8. Ibid., n.2, p.86.

but today it has dwindled to 47,000 or 48,000 hactares.[9] And there is cotton in the balanc area. Many economic managers deftly exploited the natural preserve by ploughing the preserve. Earlier the Palvan-Tugai strip along the Vakhash river's right bank was takenup for farming. Since the borders of these lands were not strictly delineated, much more than the allowable area was actually taken up for cultivation. The economic manager planned to appropriate another 12000 hactares of the preserve's territory for setting up new cotton farms. Once this is done world's sole remaining expanse of such virgin nature is going to perish, and once it has perished, nothing can restore it to its natural state On the other hand protection of the preserve and preparations for ploughing were in progress simultaneously and by the very same individuals. A common stand on the matter was that, 'to help the preserve funds must be found' and the simplest way to obtain this money was by using a part of the Tiger Gulch for cotton cultivation. It presents a classic case of 'protecting the nature by destroying it.'

When plans for a major expansion of irrigation in the Aral sea basin were developed in the 1950s and 1960s, it was anticipated that this would reduce inflow to the Aral sea thereby reducing its size . At that time many of the water

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9. "The Paper Phantom of Tiger Gulch", *Izvestia*, Jan 5, 1985, p.3. Trans. in *The Curent Digest of the Soviet Press*, vol.xxxvii, n.1, 1985, p.15.

management and desert development experts supported it as a worthwhile trade-off.[10] They calculated that a cubic meter of river water used for irrigation would be more economically beneficial than the same volume delivered to the Aral sea. They based this calculation an a simple comparison of estimated benefits from the sea in the form of fisheries and transportation. Although a small group of scientists warned of serious negative effect from the Aral's desiccation as early as the mid 1960s, but their view was not heeded.[11]

Environmental protection : A Report Card

Of late, the party and the government started paying attention to the problem of nature protection and ecological degradation. Resolutions on strengthening nature protection and improving the use of natural resources became the guide of action. Ever since the fourth session of the Eigth USSR Suprim Soviet (in September 1972) at which questions of environmental protection were considered. Significant measures started to be carried out in the

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10. "Big Push for the Truth about the Aral Sea," *Izvestia*, August 23, 1988, p.2, Trans. in *The Current Digest of The Soviet Press*, vol.XL, n.34, 1988, p.22.

11. "The Drama of Water," *Pravda*, August 11, 1989, Trans. in *The Current Digrest of The Soviet Press*, vol. XLI, n.32, 1989, p.29.

ex-USSR both to improve environment protection legislation and to increase the amounts of environment protection work.[12] Works to improve the system of managing environmental protection were taken in lhand and agencies were formed to supervise the utilisation and protection of natural resources. The Commission on environmental protection and rational utilisation of natural resources under the Presidium of the USSR council of ministers began its activity in 1981.

However, there were serious shortcomings in the work of examining resolving numerous problems relating to environment protection and the utilisation of natural resources in the light of the party central committee's current requirements. A number of ministries and departments did not always fulfill their planned assignumentes and they did an unsatisfactory job so far as envrionmental protection was concerned. A number of decisions of the party and the government were essentially aimed at correcting mistakes caused by ecological ignorance on the part of executives of certain departments and planners.[13] As a rule, concerned ministries constructed environmental protection facilities at considerably slower pace as

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12. "Responsible for Nature," *Pravda*, June 5, 1989, Trans. in *The Current Digest of The Soviet Press*, vol.XXXIX, n.23, 1987, p.9.

13. "The Rational Utilization of Natural Resources," *Pravda*, June 3, 1985, p.3, Trans. in *The Current Digest of The Soviet Press*, vol. XXXVII, n.28, 1985, p.1.

compared to the building of basic production facilities. Above all, environmental protection legislations were not fully implemented. Guided by departmental intrests and sometime by their own personal interest, officials frequently evaded compliance with the law. This did enormous damage to nature and society. The state agencies that were supposed to monitor the state of affairs in this field and combat such violations of laws were not ensuring the proper fulfillment of their assigned functions.

Almost all assignments for commissioning of economic projects, increasing output, developing cities and transportation auteries were formed with little or on consideration for environmental protection. In many cases the pace and dimension of environmental protection measures were extremely slow. At the same time there were many complaints in the operation of existing environmental protection measures. Further, environmental protection agencies were dispersed among more than 10 ministries and departments. As a result, their activity often got duplicated and all of them failed to make coordinated and efficient action in the interest of the protection of the natural complexes as a whole. Thus the existing system of managing nature failed to meet the demands of economic management. There was no comprehensive approach towards the resolution of questions of environmental protection and rational utilisation of the natural resources in various regions of the country. Productive forces were developed

without proper consideration of consequences to the environment.

Economic methods of management were also under estimated in the practice of environmental protection activity. The existing political and economic institutions of the ex-Soviet Union were never adept at interanlising the environmental costs of industrial and economic development.[14] In a number of cases capital investment was determined without adequate scientific substantiation or consideration. It adverely affected the feasibility of enterprises to combine the construction of pollution control facilities and comprehensive utilisation of resources in order to reduce production waste. The problem was accentuated by the allocation of capital investments for both the environmental protection and socio-economic development progremmes in the same head. This resulted in under-utilisation of allocations for environmental protections. Owing to the absence of effective economic levers incentives and accountability enterprises and organisations had nothing at stake in ensuring the comprehensive and rational use of natural resources placed at their disposal and in reducing the pollution level.

Another short-coming was that the works conducted to imporve nature and rational or effective use of resources were insufficiently based on the achievements of scientific

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14. Ziegler, n.2, p.67.

and technical progress. Waste-free technology which could increase the comprehensive use of natural resources and raw and other materials was being introduced at an extremely inadequate pace. In essence, most Academy and branch research and design organisations had no participation in this important State task. Serious miscalculation and errors were made by central economic agencies, USSR ministries and departments and Union Republic Council of Ministers in dealing with major questions of environment and resources planning. Production units of the USSR Ministry of Land Reclamation and Water Resources has been a constant target of criticism. There were fundamental short-comings in the land reclamation work and in utilisation of water resources for irrigation.[15] The concerned organisation most often deviated from the interest of genuine land reclamation or land improvement. Instead they were guided by the target factor, attainment of high indices for gross output and the volume of the capital they had used. Besides, Ministry of Land Reclamation and Water Resources persistently worked for implementation of scientifically susuitable projects. Upstream marshes were drained and river channels were unjustifiably straightened. Large canals and irrigation systems were built that resulted in irrational use of water resources. Thus instead of putting things in proper order, thoughtless

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15. "Supreme Soviet Discusses the Environment," *The Current Digest of The Soviet Press*, vol. XXXVII, n.28, August, 1985.

squandering of water resources was in progress. Although the area of reclaimed land expanded considerably in the past few years reclamation work was not conducted comprehensively on scientific lines. Crop rotation was not resorted and anti-erosion and other soil protection measures were not properly employed. The provision of progressive soil and moisture conserving methods of cultivation remained confined to planning stage. All this led not ony to lesser yield but also to the loss of soil's natural fertility and above all to the loss of humus.

The discreditable practice of employing the 'left over' principle in allocating materials and financial resources for the implementation of urgent environmental protection tasks was yet another factor. In the last two five year plans, state capital investment for environmental protection was under-utilised by 15 percent. The Kazakh republic made the least use of such funds and Uzbek republic fell below the national average in fulfilling assignments for putting water conservation facilities into operation.[16] As a result of this lack of discipline, a number of party and state decision relating to the implementation of environmental protection measures were carried out with deviation from established dead lines. Besides, the concerned departments were extremely slow in restructuring their activities in the light of environmental protection.

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16. See Responsible for Nature, n.12, p.9.

There were also many complaints against existing environmental protection structures. Large number of water treatment facilities were working unsatisfactorily and nearly one third of the dust trapping units in industries and power plants were ineffective or were out of order. The main reason for these violations was the short-coming in the organisation and operation of environmental protection installations. In general, there was lack of 'Supra Departmental Management' of environmental protection. Enterprises had susb-divisions for the servicing of production units and other equipment. As a rule, all these sub-divisons dealing with the operation of environmental protection facilities had it only as an additional charged. Obviously, with this practice it was difficult to achieve positive results. Thus environment protection activities were carried out on an inadequate level in the Central Asian rupublics and the pollution level in a number of cities of the region could not be reduced considerably.

Colonial Mode of Production

The Soviet conventional wisdom on the provinces maintained the economic specialisation of regions- referred to in the lexicon of the central planner as 'regionalisation,' taking advantage of the unique local resources endowment.[17] The specialised economy of the

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17. Gragory, Gllason, "The Political Economy of Depending Under Stalianism : The Asian Republics in the USSR," *Studies in Comperative Communisim*, vol. XXIV, n.4, December 1991, pp.335-53

borderland (the periphery) was said to be integrated into the all union economy in a way that maximised both local(peripheral) and central interest based on the goal of equalization among republics and nationalities.[18] However, it is doubtful that the peripheral areas fared better than or even equal to the Centre. Their growth has taken place essentially on dependent model or under internal colonisation system. The relationship between the centre and the periphery turned by virtue of the nature of structured needs of the Centre necessarily into exploitation of the periphery.[19] It made peripheral economics, in real sense, an appendage to that of the centre. The peripheral economy was forced into complementary development with the core. The economic dependence was reinforced through the legal and political measures. The centre imposed on the peripheral economics, a growth pattern that was incompatiable with the local needs, undermining to a significant extent the possibility and speed of their growth.

The vulnerable position of the dependent peripheral regions flows from an extreme specilaisation of economy on the basis of particular primary commodity.[20] Besides, lack of a significant stimulus to development was aggravated

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18. Ibid.

19. See Bury, Stevenel's,"Central Asian Elite Mobility and Political Change," *Central Asian Studies*, vol.5, n.3/4, 1986.

20. Symons, n.3, p.245.

by the drain of resources. The dependent areas concentrated its efforts on supplying raw materials to the centre and thus became subservient to the core. Agriculture was typically concentrated in one-sided export crop consequently. The region served as a captive market buying back goods produced from the primary commodities that were initially supplied. Thereby it created and perpetuated the phenomenon of under-development generally called as 'development of under-development.'[21]

In terms of generally acceptable measures of development the republic of Central Asia their and it relationship with the ex-USSR closely parallels the dependency model of 'internal colonisation.'[22] Of the large economic regions of the then USSR, Central Asian region stand out as most sharply distinctive in terms of its specialised 'one sided economy.' The regional economic structure in Central Asia encompassed a bias towards raw material production. In its main function continued to be that of a supplier of the primary products to the more developed part of the country.[23] This raw material oriented one sided economy gave birth to not only the disparities in the levels of regional socio-economic development but also look a heavy toll of ecological balance and compounded the

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21.Todaro, Michael P., *Economic Development in Third World* (New Delhi : Orient Longman, 1987), p.96.

22. Burg, n.19.

23. Symons, n.3, p.245.

deteriorating regional environmental conditions.

Although Central Asia has a broad industrial resource base with coal, iron ore, oil and natural gas and other non-ferrous metals added by a large hydro-electricity potential, yet the region has experienced only a modest degree of industrialisation. Large part of the minerals extracted in this area were syphoned out. Oil, most of which is found in the western Turkmenistan was mainly shipped out via Caspian sea. Ores and non-ferrous metals were also exported all in raw form for processisng thousands of kilometers away. Thus the main function of Central Asia continued to be the supplier of primary product to the more developed parts of the ex-USSR. The continuation of this traditional role was exemplified by developement of large natural gas deposits in Uzbekistan and Turkmenistan, which accounted for a quarter of all Soviet natural gas reserves. However, a large part of the output was piped to the energy-deficient parts of the country mainly Urals and central Russia.[24]

With its rapidly growing population, Central Asia has labour surplus but it had to rely on other regions for manufactured goods. Even pig iron and steel were brought in from other regions. The prospects of regional self-sufficiency were sacrificed to the requirements of the more developed regions. Thus the development in Central Asia

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24. Ibid., p.139.

took place in an essentially 'dependent mode of raw material mono-specialisations.'[25] The region had by far the least manufacturing per capita with relative level actually declining in every republic and its resources were shipped over-whehmingly to the European USSR in virtually unprocessed form. This gave rise to regional disproportion in economic development with key characteristics of internal colonisation.

Agriculture is Central Asia's main economic activity, but the region turned into the 'cotton base' of the ex-USSR. Central Asia's main contribution to the Soviet economy was its cotton, which contributed more than 80 percent of the the total cotton harvest in ex-USSR. But heavy specialisation of cotton agriculture (monoculture) proved to be 'agro-chemical abuse' disrupting the very economic and ecological fabric in the region.

Approximately 70 percent of Central Asia is covered by the Turan low land. With suitable agro-climatic conditions it is distinguished by its abundant heat and sunlight. The frost- free period here lasts for 180 to 250 days a year, with the average daily temperature exceeding 20 degree celcious during 120 to 150 of these days[26] Thus the accumulated temperature exceeds 3000 degree days. The rainfall in this arid and semi-arid region amounts to no

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25. Gragory, n.17.

26. Symons, n.3, p.44.

more than 70 to 200 m.m.of which only 20 to 50 m.m. occurs in the month of June, July and August (the vegetation period of cotton). Under this condition of hot and arid summer, the cultivation of cotton is possible only by means of artificial irrigation, which is harnessed from the mountainous rivers. Within this climatically suitable zone, there are regions of strong specialisation of cotton (including Farghana, the Hungry Steppe and Zeravashan Valley etc.). Where irrigation provides sufficient water during summer, cotton is given prcedence. In the main cotton regions (the oases of Central Asia including the Farghana low land, the Golodania Steppe, the Zervashan basin, Surkhan darya, Chirchik, Angren Murgab, Tedzhen and the lands of the middle and lower reaches of the Amu Darya) the share of the land sown to cotton exceeds 70 percent.[27] The current predicament which Central Asian states face is the result of historical circumstances Stalin forced Uzbekistan largely to abandon cultivation of most crops other than cotton, so that USSR could achieve it 'cotton independence.' Unfortunately the undesirable practice initiated under Stalin continued under Brezhnev and still survived during the period of Gorbachev. Its development has always been given high priority and cotton constituted two-third of the total agricultural output of the region.

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27. See Stephen Kux, "Soviet Federalis," *Problems of Communism*, vol. XXXIX, March-April 1990, pp.ff.

Cotton is the basic key commercial sector of the Central Asian economy. Over the past two decades there has been more rapid industrial expansion, on this cotton base supported by its natural gas and hydro-electricity. A broadly developed infrastructure has been formed to serve the cotton industry. This infrastructure included irrigation, several branches of machine building (for construction of cotton sowers, cultivators, harvestors and tractors etc.), chemical industry (to produce mineral fertilizers, pesticides and insectisides for cotton growing), machinery to clean cotton and to produce cotton seed oil, besides cotton mills and garment factories.

This agrarin colonial model degenerated into the dictatorship of single crop so highly specialised as cotton.[28] Both the central planning in Moscow and the regional planning, this notion took firm hold that main task of the 'cotton base of the country' was to produce cotton. The constant demand from Moscow to deliver cotton therfore implied just the cotton, not the fabric.

Though Central Asia was the cotton base of the ex-USSR yet production of the cotton textiles represented only a minor part in its economy. Only 4 to 5 percent of the cotton produced in the region was left behind, the remaining being shipped to other parts of the USSR. The share of European parts of USSR in the cotton textile production was more

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28. Paul Goble, "Ethnic Politics in the USSR," *Problems of Communism*, vol. XXXVIII, July-August 1989.

than 70 percent of the total output. The Central Asian region was forced to buy finished textile goods at inflated price.[29]

The presence of surplus labour and high unemployment rate in various parts of Central Asia (especially among the female population) strengthens the case for establising textile enterprises in the region. Providing employment (especially for the population of smaller towns, where industrial base is completely absent) is an economic and social task. There is infact no better industry for developing the economy than the most labour intensive industry. Nevertheless, Moscow continued to adhere to its practice of resource exploitation.

This 'cotton monoculture' is the affliction that alarms Central Asians the most and in large measures they blame Moscow for this economic dictate which is root of all their ecological problems, and related regional economic backwardness.

To maximise the production of cotton at any price it was impossible to let the soil rest. The ever increasing cotton production was achieved by ignoring proper crop rotations excessive use of harvestors and by the abuse of chemical fertilizers and pericides. Cotton has been cultivated on many fields without interruption, for some 50 years that exhausted the soil

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29. Symons, n.3, p.245.

fertility, draining off all its vitals (nutrient elements and compounds) which are necessary for balanced growth of specific plants. Adequate crop rotation practice has not been taken into account. Too frequent cropping of a soil with the same crop led to a serious build up of plant pests in the soil. Whereas normally sown acreage of cotton should not exceed 50 to 60 percent, its share reached more than 85 percent. As cotton has low immunity to disease and infestation , massive amounts of pesticides were employed that killed every living thing in the fields. Increased mechanisation of the argiculture also had its adverse effect on the soil fertility. Tractors crossed the fields up to 30 times a year that compressed the soil destroying its micro- organisms. Hence the fertile soils got exhausted and agricultural production witnessed dimnishing return. Ultimately the sown acerage reached its absolute limit to fulfill constantly increasing demand. Yet Moscow, operating on the principle that one must go beyond the attained target, the cotton production targets were raised high. For even increasing cotton demands many new lands were developed in the region and only cotton was planted on them. Reservoirs were carelessly constructed and massive expansion of the irrigation system took place to reach out the increased are under cotton crops. It resulted in great decrease in both quantity and quality of water more particularly in Uzbekistan and Turkmenistan besides other parts of the region. In some parts of Karakalpak ASSR there

are settlements where only 5 percent of the water is safe for drinking. One of the salient reasons for the poor and even harmful condition of drinking water in Central Asia is the eccessive use of fertilizers, pesticides and defoliants. Its amount was generallv in-excess to those used in other areas of the ex-USSR. Almost everv vear the use of the poisonous chemicals on cotton corps in Uzbekistan amounted to 54.5 kg. per hectare. while the average in USSR was 1 kg. onlv. The same is true of mineral fertilizers. On an average each hectare of land in USSR received 30 kg. of mineral fertilizers. in Uzbekistan it amounted to 480 to 600 kg. which is an astonishing disproportion.[30] Same is true of other cotton growing regions in Central Asia (See Table no.8).

Such an eccessive use of large amount of fertilizers and toxic chemicals has worsened the quality of drinking water and affected the health as a whole. particularly the rural population. A catastrophic situation has developed around the areas of the Aral Sea. more so in the Karakalpak region in Turkmenistan. Here tons of chemical substances in the form of defoliants. herbicides. insecticides and other chemical preparations have been spread on farms. These substances slowly percolate into the food and water supplies. which cause the death of people. The use of

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30. Charlisle Donald S., "Uzebistan and Uzbeks." *Problems of Communism.* vol. XL. September-October 1991. p.33.

Table 8

Application of Mineral fertiliser/hec of sown land in Kg.

Repb.	70	75	80	85	87
USSR	46.8	77.5	83.9	113.2	122.1
RSFSR	32.9	59.9	67.5	96.0	106.3
Ukrainian SSR	65.1	111.8	112.4	153.4	157.4
Belorussian SSR	159.6	280.2	252.4	321.1	347.5
Uzbek SSR	203	238.3	263.1	285.6	311.0
Kazakh SSR	7.5	14.4	16.5	30.7	34.0
Georgian SSR	132.2	188.9	163.1	260.5	251.0
Azerbaijan SSR	57.9	138.7	136.1	178.9	199.5
Lithuanian SSR	154.9	223.2	241.4	305.4	305.3
Moldavian SSR	54.7	95.9	148.4	196.1	195.8
Latvian SSR	196.4	220.7	219.1	287.2	321.4
Kirghiz SSR	103.3	146.5	153.9	210.1	220.5
Tadzhiz SSR	165.0	220.3	225.3	249.0	291.9
Tadzhiz SSR	101.0	146.1	153.2	206.9	185.4
Turkmen SSR	205.3	241.3	248.0	251.1	247.2
Estonian SSR	208.9	238.3	247.0	289.3	291.5

Source:Soviet Geography, vol.8. no.2, 1989.

defoliants in the cotton fields is harming the women in particular, driving up infant mortality rates.

Harmful effect of the cotton economy on health is not limited to chemical pollution alone. Every aspect of Central Asian environment is equally infested affecting the whole ecosystem. Pesticides and fertilizers continuously pollute the regional water bodies, as do industrial waste and urban sewage, making the water unfit for drinking. The cumulative effect on the health of the population is manifested in high level of mortality and disease.

The Aral sea, already considered 'doomed to death' due to the agro-economic short sightedness and ambivalance and ecological illiteracy of the bureaucrats threatens to worsen the epidemiological conditions, resulting in an increase in life threatening diseases and illness for the inhabitants of Karakalpak, Khorezm and adjacent oblasts.[31] The increased salt content in the air deflected from the Aral sea sharply reduced the amount of available drinking water for the people in the region. Not only that this water already contains large amounts of pesticide and fertilizer residues. Because of increase in the amount of salt in the sea itself, crops are being ruined besides adversely affecting the drinking water supplies.

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31. See Micklin, Philip P., "Desiccation of the Aral Sea : A water Management Disaster in the Soviet Union," *Science*, vol. 241, September 2, 1988, pp.ff.

Chapter III

ARAL SEA CRISIS-AN EVALUATION

Today the ecological conditions in a number of regions are such that not simply protection but ecological reanimation is required. The ecological catastrophe which has taken place and is still taking place in the Aral sea in its scale and projected consequences is comparable to large-scale world catastrophies.

The fate of Aral sea has been causing increasing public concern in the Central Asia. The drop in its water level and shrinking of its size caused by growing consumptive withdrawal of water without any return flow from its tributaries (the Amudarya and Syrdarya) and its negative impact on the environment and socio-economic conditions of the Central Asian region, has generated a lot of concern over the future of the Aral Sea. The recession of the shore line is expected to produce wide impact on the environment of the desert and semi-desert zone of the Central Asian plains. The progressive desertification and degradation process is evident in the former hydromorphic complexes. Growing mineralisation of the ground water with an increase in the chlorine ions has led to salt deposition in the soil. The fringing forest (*tugay*) is decaying and getting thinner. On the other hand the increasing withdrawals of water from the Central Asian rivers for irrigation has rendered them

increasingly shallow. This has enhanced the possibility of drift of the stabilized sand and delta. There is further scope of modification (deterioration) in the physical geographic setting in the adjoining desert zone of Central Asia, that might occur if the Aral sea dries up.

The reason that, the Aral sea is drying-up is clear to every one. The enormous siphoning of water from Syrdarya and Amudarya by irrigation system in Kyrgyzistan, Uzbekistan, Turkmenistan and Kazkhstan without any return flow is the main cause. The future of Aral sea is also affected by the faulty water management projects within the drainage basin.

The Aral Sea Basin: Physical Dimension

The Aral region, for all practical purposes is the entire territory in Central Asia within the Aral sea basin. It comprises of the great arid and semi-arid Turanean lowland east of the Caspian sea, flanked by Pamir Altay and Hindukush mountains on the southern side and Kazakh uplands, (hills and plateaus) on the northern side. The entire lowland is studded with large expanse of sand desert; the Karakum between Caspian and Amudarya, the Kyzylkum between the Amudarya and the Syrdarya, the Muyunkum to the east of Syrdarya and the Taukum on the southern side of the lake Balkhash.[1]

The Central Asian region has a closed

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1. Symons, Leslie, (ed.), *Soviet Union : A Systematic Geography* (London : Hadder and Stoughton, 1983), p.73.

hydrological cycle and it has an inland drainage system, without any streams being connected to the ocean. The incoming water supply of the arid lowland or pidmount area is provided mainly by surface runoff from the mountains with some ground water flowing within alluvial fans in the foot-hills. Since it is a desert region, the only permanent water sources are those which originate in the lofty mountains of the south. Most of the rivers from these high-lands become dry and peter-out as they emerge on the hot arid plains, including some sizeable ones as Chu and Sarysu as well as some smaller ones from Kazakh upland. Only two rivers Amudarya and Syrdarya maintain their flow and after traversing the desert of Kyzylkum and Karakum and enter into the Aral sea, a large barkish water lake. Amudarya is the largest river of the Central Asia.[2] It rises on the northern slopes of the Hindukush and is fed by various tributaries, such as Vakhash, coming from high glacier and snowfields which provide abundant water to this river.

In addition, supplies of water are also available from underground sources. The geological structure in the Turanean low-land is highly favourable for the supply of ground water. The rock formation contains a series of water bearing layers, containing abundant artesian water. The sources of this artesian water is the heavy precipitation,

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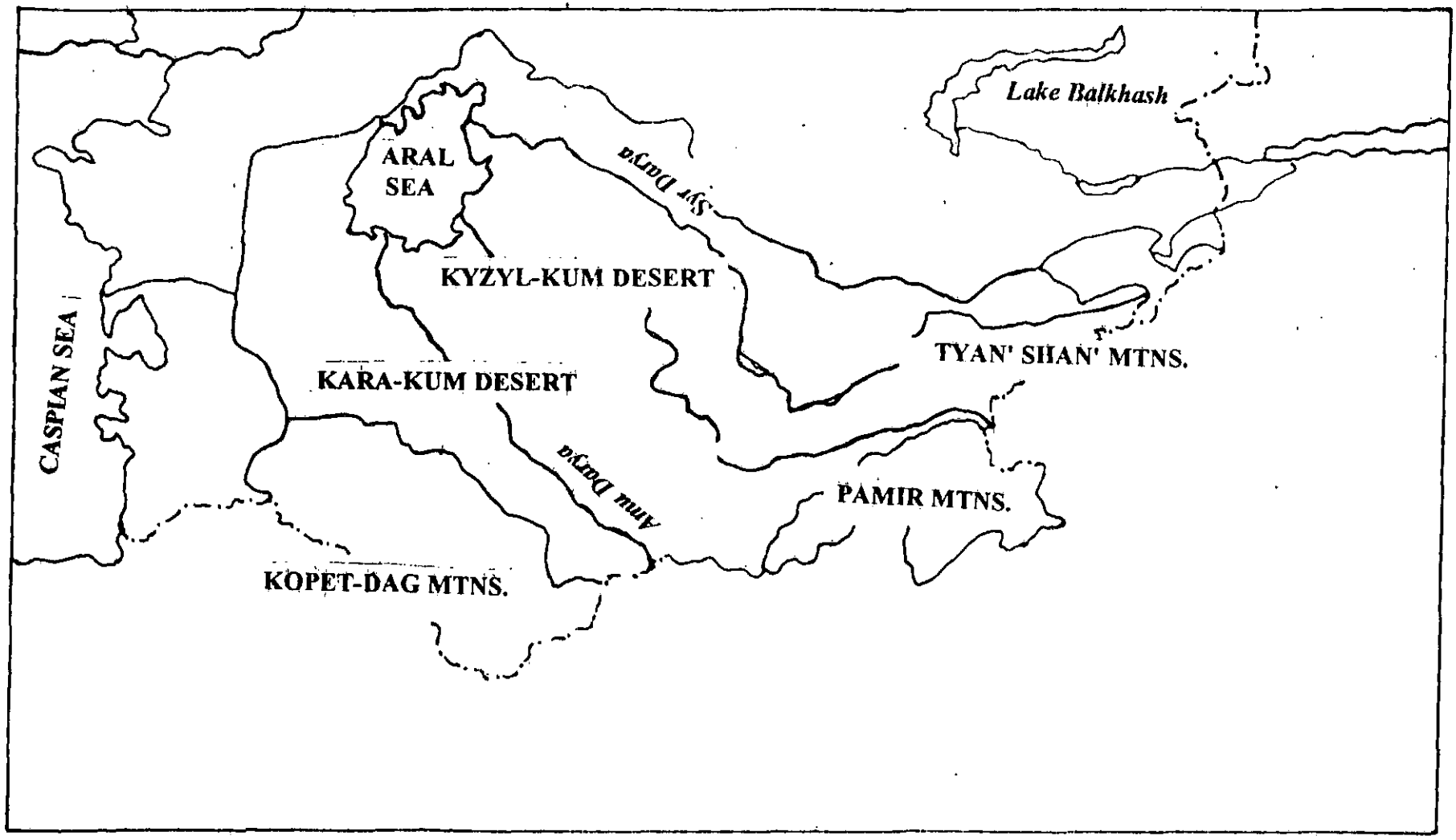
2. Ibid., p.80.

PHYSICAL MAP OF ARAL SEA BASIN



snow and glacier of the southern mountains ranges. At the limits of the Turkmenistan many under-ground water sources of varying mineralisation come out on the surface.

Most of the water resources (both surface and subsurface water) are formed in the mountains of the Aral sea basin and the runoff formed in the mountains is spent in the vast plains of the basin. The surface water resource in the Aral sea basin totals 127 cubic kms in the average year[3] and they are distributed as fallows:-

Table - 9

Amudarya basin	79.5 cubic km (62%)
Amudarya proper	68.1 cubic km
Syrdarya basin	37.2 cubic km (30%)
Syrdarya proper	33.8 cubic km.
Internal drainage of Kyrghizstan and southern Kazakhastan Chu, Talas, Assa and other rivers.	10.2 cubic km (8%) 5.8 cubic km.

Sub-surface water resources that can be used without any deterimental effect on the surface runoff is about 15 cubic km that includes 7.65 cubic km in the Amudarya basin, 7.3 cubic km in Syrdarya basin and 0.55 cubic km in other drainage basins. This annually renewable water resource of

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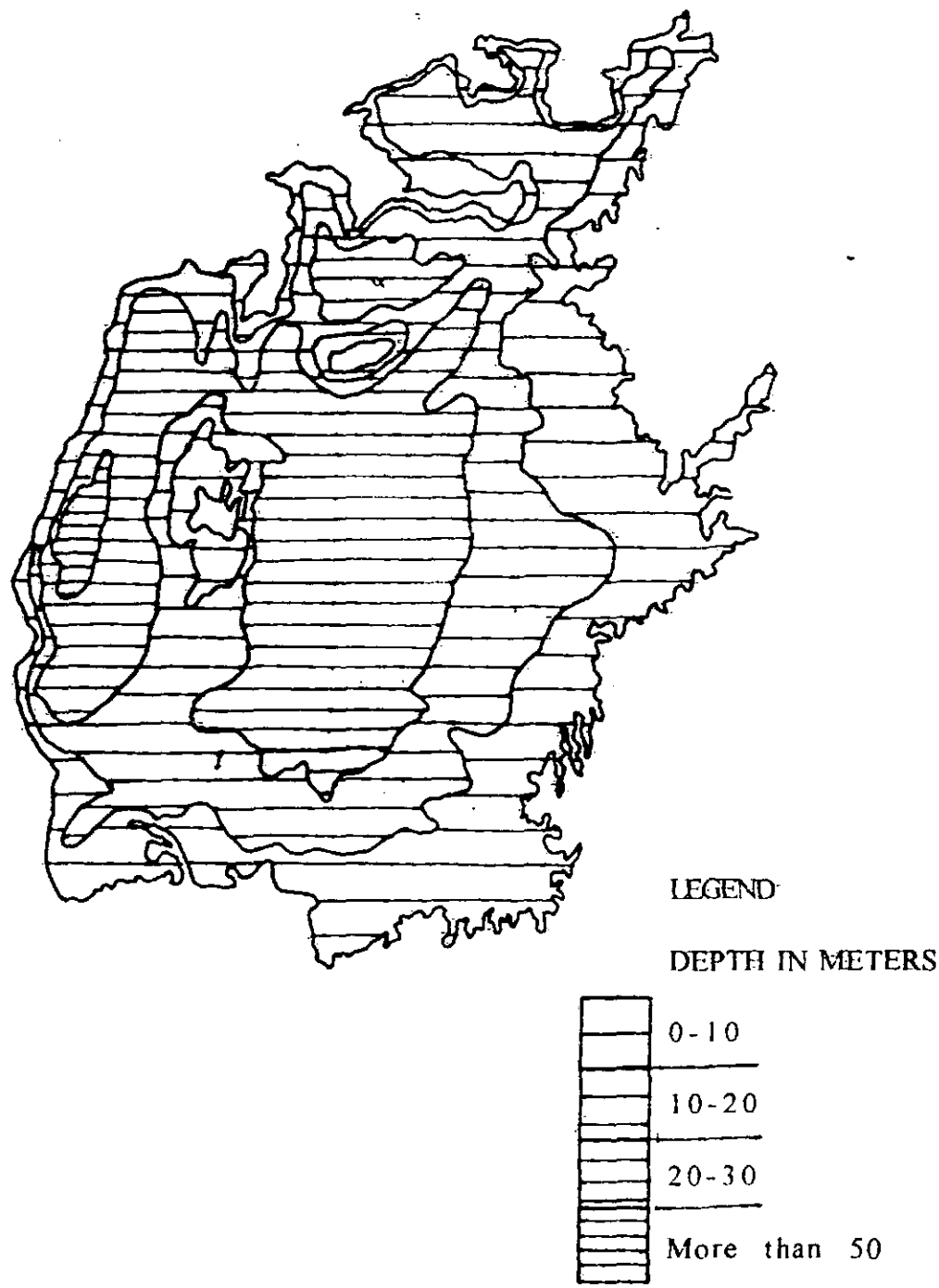
3. Krenke, Minayeva and Tsigel'naya, "The Present State and future prospects of using Local Water in Central Asia and Sourthern Kazakhastan," *Soviet Geography-Review and Translation*, vol.xxii, n.6, June 1982.

BATHYMETRIC MAP OF THE ARAL SEA



the region comes to total of 143.2 cubic km.[4] The maximum amount of water that might be diverted from all the rivers in Central Asia, assuming, adequate regulation of the stream flow, is 104.2 cubic km.[5] But the actual amount of water available after inevitable losses, ie., the amount on which the Central Asian economy can count is 91 to 92 cubic km.[6]

The heat resource in the Central Asian plain are adequate for cotton cultivation. The soil resources of the region are also quite substantial. Thus the region has high potentiality for tremendous agricultural expansion given the adequate water supplies by irrigation. But it has been estimated that even if all the surface water of the Central Asia were used for irrigation it would suffice for only 10 per cent of the available land resources. Irrigation is the main user of water in Central Asia.

Exploitation Of Aral Sea: Implications

In the late 1950s and early 1960s a decision was made for the massive expansion of irrigation in Central Asia to increase raw cotton production. The high productivity of the irrigated land has accounted for the continuous

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4. Ibid.

5. Rafikov, A.A., "Environmental changes in Southern Aral Region in Conection with the drop in the Aral Sea level" *Soviet Geography*, vol. xiv. n.7, 1984.

6. Ibid.

expansion of irrigation in the region and the increasing withdrawals of water for irrigation from Amudarya and Syrdarya, the principal rivers feeding the Aral sea, especially in their upper and middle reaches. All the plans for future use of the water and land resources of the Amudarya and Syrdarya basins that have been worked out in the last 30 years, recommended using discharges of these rivers for irrigation, leaving little scope for preserving the Aral Sea. Since 1966 more than 15 million hectares of irrigated land have been added in Central Asia raising its total to more than 7 million hectares of land (See Table-10). Withdrawals for the irrigation in 1970 were 71.5 per cent of the combined streamflow of the Amudarya and Syrdarya.[7] Thus a large volume of the available water resources had already been commited to irrigation purposes. The result was acute shortage of water, particularly in the syrdarya basin and the water use exceeded the streamflow. Ever since 1970 the resulted demand for water was met through the use of return flow of water draining back in the rivers. The situation was not better even in the Amudarya. Here too, the available water resources are expected to get exhausted soon. Additional water resources will be required for any further expansion of the irrigated area. The excessive withdrawals of water for irrigation have resulted in a decline in the inflow into the Aral sea (See Table11).

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7. Ibid.

Table 10

Area of Irrigated Land by Republics in Kazakhstan and Central Asia(thousands of hectares)

Republic	1950	1960	1965	1968	1970	1971	1972	1973	1974	1975	1976
Uzbek SSR	2276	2571	2639	2666	2697	2721	2774	2832	2915	3006	3132
Kazakh SSR	1393	1466	1368	1265	1450	1479	1509	1551	1601	1648	1707
Kirghiz SSR	937	929	861	869	883	891	897	905	904	911	924
Tadzhik SSR	361	427	468	506	518	528	535	543	552	567	582
Turkmen SSR	454	496	514	543	643	672	698	927	796	819	846

Source: Computed from data in Selskoye, 1988.

Table 11

Inflow Into the Aral Sea (in cubic kilometers)
data from the Hydrometeorological Service Uzbek SSR)

Year	Amudarya (at Temirbay)	Syrdarya (at Kazalinsk)	Total
1959	40.0	18.3	58.3
1960	37.8	21.0	58.8
1961	29.2	-	29.2
1962	29.1	5.7	34.9
1963	29.9	10.6	40.5
1964	36.5	14.9	51.4
1965	25.2	4.6	29.9
1966	33.1	9.5	42.6
1967	28.6	8.6	37.3
1968	28.9	7.2	36.1
1969	55.1	17.5	72.6
1970	28.7	9.8	38.6
1971	15.3	8.1	23.5
1972	15.5	6.9	22.4
1973	33.4	8.9	42.3
1974	6.2	1.9	8.1
1975	10.0	0.6	10.6
1976	10.3	0.5	10.8
1977	7.2	0.4	7.7
1978	18.9	-	18.9

Source: Borovskiy V.M .. The dying out of the Aral Sea and its Consequences Soviet Geography, vol.X, no.5. 1980.

As a result the Aral sea level has been gradually dropping since 1961.

The fundamental cause of the water crisis in Central Asia and related environmental problems in Aral region is chiefly related to irrigation. It follows that the level of the Aral sea was heavily dependent on the amount of water contributed by the two major rivers, with the Syrdarya contributing 13.5 cubic km (discharge at its mouth) and Amudarya contributing the rest. In 1960, the Aral sea had an area of 66000 square km, a maximum length of 424 km and a width of 292 km with the mean of 16.1 meters.[8] The eastern half was shallow with the 10 meter isobath reaching a distance of 60 km from the shoreline and a maximum depth of 69 meters. The volum of the water was estimated at 1061.6 cubic km with the salinity of 10 to 11 gms. per liter.[9] On the income side of the water budget the inflow of the river water was 52.0 cubic km, precipitation 5.8 cubic km and on the out go side the principal item was the evaporation of 57.7n cubic km or a layer of 900 mm.[10] From 1930 to 1960 on an average more then 50 cubic km of river water flowed into the sea every year, flow fluctuating from 64 cubic km. to 33 cubic km. with high water years and low water years respectively. About 9 to 10 cubic km. water was added

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8. Borovskiy V.M. "The Drying Out of the Aral Sea and its Consequences." *Soviet Geography*, vol. x, n.5, May 1980.

9. Ibid.

10. Ibid.

from precipitation falling on the sea surface. Thus, a balance was maintained between water flowing in and the sea water loses through evaporation. Since the early 1960s the flow of river water in the Aral Sea witnesed sharp reduction. The reduced supply fell to 35.2 cubic km. a year by 1970 and to 10 cubic Km.[11] a year by 1980. Since 1986, virtualy no water at all from Amudrya and Syrdarya reached the sea. Due to the reduced inflow the water level in the sea was down by 7 meters. Its volume had been reduced by 304 cubic km with increased salinity of the water, and some 14000 cubic km. of sea bed had been laid bare.[12] Now the prospect of turning into residual basin pond of the sea is becoming more real. Unless some very resolute measures are taken immediately in next 15 to 20 years the sea will fall into the category of bitter-salt lake with an area one-sixth or one-seventh of the original sea. The level of the Aral sea continues to drop approximately 90 centimeters per year. About 30,000 cubic km of its bottom have become susceptible to the formation of desert,[13] (See table 12).

It needs to be noted that the drop in the Aral sea level and the desertificaion of the Aral region were

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11. See Rafikov, n.5.

12. Ibid.

13. Micklin Philip P. "Desication of the Aral Sea : A Water Management Disaster in Soviet Union," *Science*, vol. 241. September, 2, 1988, pp.1170-76.

Table 12
Water resources and use in the Aral Sea basin in 1988

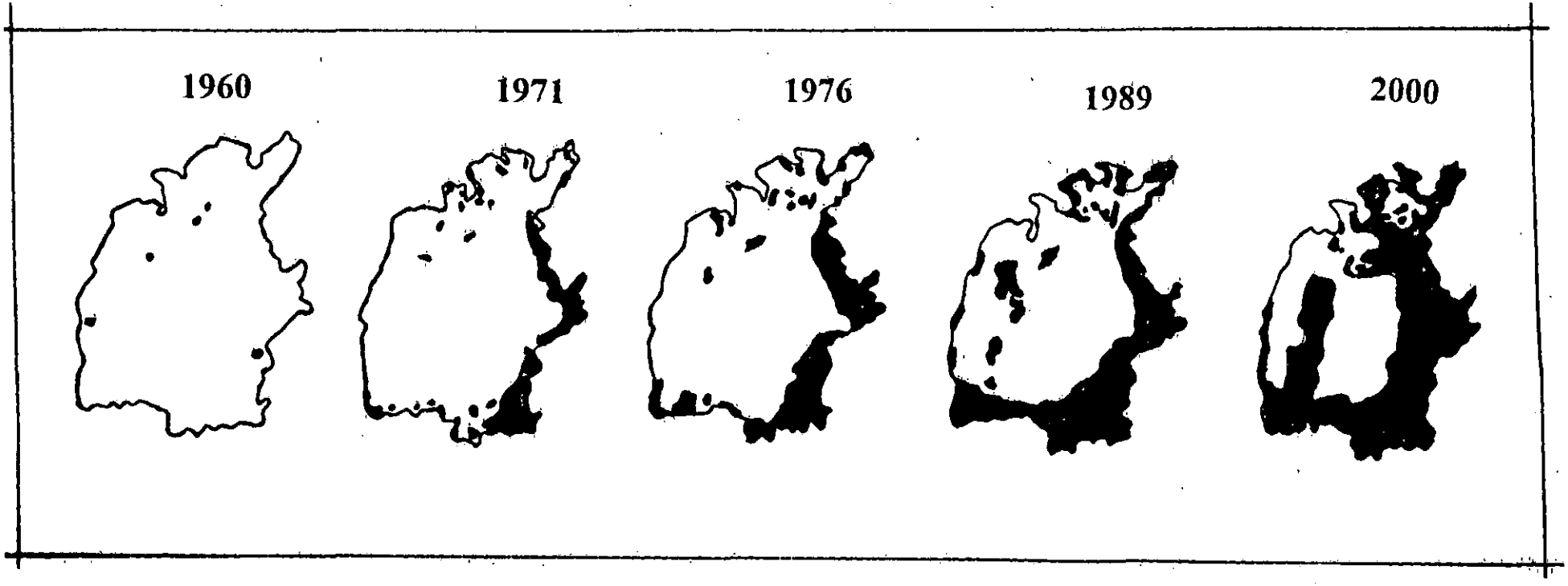
Water resource/use parameter	Amu Dar'ya basin	Syr Dar'ya basin	Other*	Aral Sea basin
Average annual flow (km^3)	69.50	37.00	11.00	117.55
Confirmed safe groundwater yield (km^3)	9.00	7.40	n.a.	16.40
Total average annual water resources	78.50	44.40	n.a.	133.95
Water withdrawals (km^3)	77.35	64.22	25.71	167.28
as % of average annual water resources	98.53	144.64	n.a.	124.88
Surface sources	75.92	60.30	23.47	159.69
as % of withdrawals	98.15	93.89	91.27	95.46
as % average annunal flow	111.29	173.57	232.69	142.31
groundwater	1.43	3.92	2.24	7.59
as % of withdrawals	1.85	6.11	8.73	4.54
as % of groundwater yield	20.51	82.53	n.a.	27.68
Consumptive water use (km^3)	57.07	43.36	20.56	120.98
municipal	0.99	1.85	0.77	3.61
as % of use	1.74	4.26	3.75	2.98
production (without agriculture)3 .49	5.52	3.21	12.22	
as %.of.use	6.11	12.73	15.63	10.10
agricultural	52.59	35.99	16.57	105.15
as % of use	92.15	83.00	80.62	86.91

Table - 12 contd.

Water loss in transport (km^3)	18.49	10.45	4.70	33.64
as % of withdrawals	23.90	16.28	18.28	20.11
as % of average annual flow	26.60	28.25	42.52	28.62
as % of average annual water resources	23.55	23.54	n.a.	25.11
Return flows to surface water (km^3)	16.95	15.89	5.05	37.89
as % of withdrawals	21.91	24.74	19.63	22.65
as % of annual flow	24.39	42.95	45.67	32.23
as % of average annual water resources	21.59	35.79	n.a.	28.28
Polluted return flows (km^3)	0.09	0.36	0.12	0.57
Consumptive use plus transport losses (km^3)	58.60	37.92	20.21	116.73
as % of withdrawals	75.77	59.05	78.61	69.78
as % of average annual flow	84.32	102.49	182.90	99.31
as % of average annual water resources	74.65	85.41	n.a.	87.15

* Basins of the Kashkadar'ya, Zeravshna, rivers of Afghanistan and Turkmenistan (including Kara-Kum Canal).
n.a.: not available.

Sources : Taken or calculated from Okhrana okruzhayshchei sredy i rational'noye is polozovaniye. prirodnykh resursov v SSSR (Moscow: Goskomstat. 1989), pp. 66-7, and other sources.



DESICATION IN ARAL SEA

affected not only by an increase in the area of irrigation, but also by the in-efficient use of water in the upper and the middle reaches of the Amudarya and Syrdarya. Water has been classed as an inexhaustible resource, an attitude that has led to the high wastage of water particularly in the application of irrigation of farmlands.

Because of the small number of concrete lined irrigation channels, water resources are being used unwisely and very wastefully. Yearly loss of water through seepage is too large. Large volume of water gets evaporated from the fields. Besides the water is lost through seepage as water-proof linings are not widely used. There are evidences of water losses or wastage of present supplies through inefficient technique. It also causes soil damage by accumulation of harmful salts. The water management project within the drainage basin was also faulty. The Karakum canal, the Amubakhara canal and other projects divert water into the neighbouring drinage basins making it difficult or even impossible to return the used water to the Amudarya or the Aral sea.[14] The Aral sea is a unique geographical feature. There is probably no precedent in world water management practice and in the history of the natural science where a major water body has been condemned within a relatively short time to beocme a residual salt reservoir, thus converting one ecosystem into a totally different

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14. See Krenke, and Others, n.3.

ecosystem. Such a transformation of the Aral sea is likely to have ecological consequences on a scale that is difficult to imagine. The flourishing irrigated oases that has been developed at the a cost of Aral sea will also decay with the dying sea affecting the economic, geographical and social aspects of the region. A radical modification of environmental components, ecological conditions and of the ecosystem as a whole has taken place in the Aral sea region accompanied by sharp reduction in stream-flow and drop in the sea level.

Since 1961 the Aral sea level began to drop independently of the climatic conditions of the region, all due to the anthropogenic factor. The sea is the principal salt receipient of the whole region with a mean annual inflow of 32.2 million tons.[15] The decline in the water discharge of its two main tributories - Amudarya and Syrdarya, as a result of human activity has also entailed as yet unknown reduction in the salt runoff. Instead of reaching the Aral sea a geat deal of salt is now accumulating in the plains of Central Asia.

Drop in the sea level combined with the intensive evaporation of the salt water gave rise to salt accumulation. The enclosed lacustrine depressions, narrow embankments and lagoons have gradually turned into wet solonchak and some other have finally dried up and became

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15. See Borovskiy, n.8.

salt deposits with a thicknes of up to 1 meter and a reserve of up to 400 tons of salt per hectare.[16] There are also many depressions or former ponds that were left by retreating sea with encrusted and occasionally building solanchak (large expanses of soil containing salt). They have salt content as high as 600 tons per hectare in top 50 cms. of its layer.[17] It is added by the salt rising to the surface from brackish ground water through capilary action (from a depth of up to 4 meters) and salt acumulating at points of discharge of barkish sub-surface water predominantly of sulphur and chloride composition. The ground has been coverd like snow.

These solonchak pose the greatest threat as source of wind blown salt. There is also danger of wind born transportation of salt deposits from the sea bed. The deflection of the salt deposits will further intensify from the dried up margins of the sea bed if the water table continues to drop. It was estimated that on an average inflow of 20 cubic km. per year into the Aral sea and maintainance of water table at the level of 33.5 meters would bear the lake bed area of roughly 40, 000 sq. km.[18] In due course of time that area will be entirely covered by

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16. Ibid.

17. Ibid.

18. Kuznetsov. N.T. and Others, "Complication of Alternative Predictive maps of the Natural Environment and of Reclaimation Measures for the Plains of Central Asia, *Soviet Geography*, vol. xxiii, n.7, 1983.

solonchak which will lead to millions of tons of salt being deflected by wind over the Central Asian plain. Some parts of Turkmenistan now receive up to 30 tons per sq. km. salt with atmospheric precipitation.[19] Another important threat is that if these salts enter into the larger sub-basin it will further enhance its salinity. The over-all salt content of the Aral sea has been estimated at more than 100 billion tonnes[20] with the following percentage composition:-

Table - 13

NaCl	56.07%
KCl	2.05%
MgCl	0.82%
$MgSO_4$	25.87%
$CaSO_4$	14.98%
$CaCO_3$	0.21%

The regulation of the hydrological regime and reduction in the stream flow in the Amudarya delta have produced modification in the water features and ground water regime besides the development of the soil and landforms. It has also brought in changes in the ecological condition of the flora and fauna of the region.

Until 1961 , the lower reaches of the Amudarya were

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19. Ibid.

20. See Borovskiy, n.8.

dominated by a complete hydromorphic natural complex (lakes and bogs, fringing forest and coastal solanchak etc.). The eastern portion of the delta was predominantly of semihydromorphic complex, as due to its higher elvation this area was not getting regularly flooded. This entire area has undergone intensive transformation.[21] Except for few patches that get regularly flooded and replenished with water, extensive areas have dried up. Fringing forest (*Tugya*) has been replaced by tussocks of reed root-stalks and stems. The bog soil has given place to typical solanchak. The water table has gone down by 3 to 5 meters and to some places to as much as 7 to 8 meters. The chemical composition of the ground water has also witnessed considerable change with an increase in its salt content, with a predominance of sodium chloride and sulphur with a mineralisation of more than 35 grams per litre or more. It is more severe around the dried up lakes on the Aral sea shore with as much as 100 gram mineral ions per litre or more.[22] Rise in the ground water minerlisation has also adversely affacted the growth of fringing forest. On the other hand , steady drop in the water table is accompanied by accumulation of salt at the surface and in the root layers of the soil with aeration zone of 3 to 4 horizons at an interval of 30 to 40 cm. It contains solid residue of

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21. See Rafikov, n.5.

22. Ibid.

more than 2 to 3 percent with perdominance of chloride sulphate salinization.[23] Salt has also accumulated along vertical cracks found along rotting root-stalks of reeds or along desication cracks. Concentration of salt in the aeration zone of top 1 meter layer ranges from 50 to 400 tons per hectare and in the next 1 meter layer from 200 to 600 tones per hactare. According to mineralisation chlorine alone counts for 10 to 255 tons per hectare and from 6 to 160 tons per hactare in the two layers respectively[24].

The soil charasteristics have also been profoundly affected by the reduction of water table in the delta, accompanied by decrease in delta flooding. Before the degradation of the hydromorphic complexes there was bog soil in the delta flood plain and meadow soil in the flat areas between arms. The extreme south-west and eastern portion of the delta was covered by meadow plain and meadow claypan fringing forest soils, typical meadow solanchak covered along the shore of the Aral sea. Presently the bog soils, flood plains and meadow soils have given way to typical meadow solanchak and to meadow clay-plain soil respectively. These soils are ultimately expected to turn into claypans.[25]

The Syrdayra delta has also undergone similar transformation. All these soils are saline, with highest

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23. Ibid.

24. Ibid.

25. Ibid

degree of salinity found in the typical black and meadow solanchak. During the period between 1960 to 1985, the area of the solanchak in syrdarya delta has almost tripled.

The plant cover of the delta has also undergone radical changes. Before intense desication, delta area of about 76000 hectares had a distinctive floral landscape predominated by reed communities. It all has completely dried up now and its area has dwindled to 2000 hectares only around a few lakes that get intensively flooded.[26] The floral community of reed has been succeeded by salt and drought resistant vegetation. With an association of various species of Tamarisk and salt-wort, that is to say, the plant succesion has taken place in a typical sequence of hydrophytes to halophytes. Ultimate result has been the loss of a huge area of highly productive range and hayland. The changes in the hydrogeoloy and hydrology has also had an impact on the fringing forest (Tugay) of moisture loving trees and shrubs that occupied a strip along the Amudarya delta arms extending from 5 to 6 kms in width. The fringing forest earlier served as nearly year round pasture and also as a natural barrier against all from soil erosion. Until 1961 fringing forest covered a total area of 260,000 hectares but now its area has come down to one fifth of the original.[27] Two factors are mainly responsible for the

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26. Ibid.

27. Ibid.

disappearance of the fringing forest in this region one, the disruption of the past flooding or the evaporation of the stream flow along the delta and secondly, the general salinisation of the soil and the ground water. A similar reduction in the fringing forest has occurred along the delta arms on Kipchak darya, Erkhn Darya and Kazakh darya and in the areas of the Mashankul and Khodrahakul lake systems. Such reduction in the fringing forest has also taken place in the areas of Alizaral, Zairbay, Suzala and on the shore of the lake Zaikirkul. The fringing forest that survives now, has also been greatly thinned and oppressed and is being replaced by salt wort species and other drought and salt resistant plants which are much poorer as pasture than the previous shrubs and tree associations.[28]

The drying up of the river, the drynes of the soil horizon down to a considerable depth and the disappearance of the soil retaining reeds and fringing forest have given rise to deflation process in the areas that were earlier used to be water logged. Severe wind erosion is now common through-out the Aral region and newly exposed sea bed. The higher land forms of the delta plain are made up of fine grained sand and loams, deposited during the numerous channel shift of the rivers in the past.[29] As a result of

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28. See Borovskiy, n.8.

29. Ibid.

the drying of the upper soil, these deposits are now being blown above by the wind. The dominant relief shaping process is now the depletion and accumulation of sediments giving rise to landforms and hillocks. It has also giving rise to the sandstorm and whirl winds. Salt crystals also rise with dust into air and are deposited long distance away. The most significant modification has been observed on the exposed former sea bottom. Wind erosion is most evident in unconsolidated areas from where dust and salt crystals are carried away. With the sea's disapperance or retreat of water as it dries up completely, its bottom will inevitably become a desert and will serve as a source from which wind will blow sand, soil and salt, carrying these materials for hunderds of kilometres away. It has been witnessed that southerly wind blowing across the dried bottom of Sharysingank and the small Aral sea (*Maloye Aral' Skoye more*), to which it is connected, is causing frequent dust and salt strom in Aral'sk. Although it is difficult to make precise calculation, only preliminary estimates are available. Accoridng to some reasonable calculations 15 to 70 million tonnes of dust are lifted into the atmosphere every year and an average upto 520 kilograms of sand and salt falls per hectare of land in the Aral region[30]. The prevailing westerlies carry salt into the region to the east of the Aral sea over a distanceof of 200 kilometers inland

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30. Ibid.

and along 400 kilometers in front in the Karakalpak area and Khorezm (Uzbekistan) and Tashauz (Turkmenistan). In view of the hazardous nature of salt, its wind born transfer poses a serious danger for plants and soils in the farm land of this entire region.[31]

Soil salinisation, common to other arid and semi-arid parts of the world, has been a particularly acute problem in Central Asia. Excessive watering of soil has contributed to the condition of secondary salinisation. It occures after the ground water level rises due to the application of too much water to the crops. The surplus water seeps downwards to the water-table, or because water escapes from the irrigation canals. The effectiveness of irrigation drops sharply with salinisation and pollution of water. In the lower reaches, the great rivers of Central Asia carry solution of soil, salt, defoliants, insecticides, chemical fertilizers and industrial and house-hold wastes. Due to the presence of more salt, one has to resort to use of more water to get the same yield.

The flow of artisian wells and level of ground water has dropped all around the sea, leading to dried wells and springs. The reduction of the river flow, lowering of the ground water levels and growing salinisation have caused drinking water supply problems. The continuing practice of discharging polluted wastes of agricultural, industrial and

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31. Ibid.

urban affluents into the rivers has led to worsening river water quality and complicating the sanitary and epidemiological situation in the lower reaches of the rivers. Above all the, people there drink water from the same rivers and contaminated under-ground sources. This has led to the alarming growth in sick rate of the local population. Drinking water contamination is believed to be the main cause of high rate of intestinal disorders hepatitis, kidney failure and liver ailments, oesophageal cancer, birth defects and even typhoid and cholera. The sanitary and epidemiological situation in the Aral region related to the shortage and low quality of drinking water especially in the Kara-Kalpak region is most alarming and requires urgent remedial measures. Poor quality of drinking water, poor health care, inadequate diet and frequent child bearing has contributed to high mortality rate among women and infants. In the kara-Kalapak resion the infant mortality rate was more than 60 per thousand. Tashauz oblast of Turkmenistan partly situated in the Aundrya delta, had an infant mortility rate of 75 per thousand in 1988.[32]

The Aral's shrinkage and the greatly reduced flow of the syr and Amudarya has devastated these rivers' delta. About thirty years ago the deltas not only possessed great

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32. Micklin Philip P. "Watermanagement in Soviet Central Asia: Problems and Prospects in, Stewart John Massey's (ed.) *The Soviet Environment Problems, Policies and Politics* (New York : Cambridge University Press, 1992).

ecological value, but also provided livestock pasturage for breeding commercial fish and reeds, used in the paper making industry and for home construction by the local inhabitants. These uses have been lost or severely degraded. Disappearance and degradation of vegetational complexes and drop in water table have contributed to desertification in both deltas.[33]

Drying up of the Aral sea has also had a profound impact on the climate of the region. Climate around Aral has become more continental and drier with warmer summer, cooler winter and lowered humidity, particularly within 50 to 60 km radius of the former shore line. This is believed to have shortened the growing season on the northern margins of the Kar-Kalpak region Here cotton cultivation has given place to rice cultivation which is unfortunately more water consuming in nature.[34]

Several other major adverse consequences in the Aral's recession are also apparent as everything there has become interwoven. The socio-economic consequences involve a significant change in human activities. A change in the crop patterns resulting form climatic modifications and the problem of job placement as traditional activities are phased out. The rising unemployment problem for former fishermen and seamen and critical transportation situation

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33. Ibid.

34. Ibid.

in and around Aral basin are all related to the desication of the Aral sea. Aral'sk, which is located at the former northern extremity of the Aral in the former Kzyl-orda oblast of Kazakhstan has a population of thirty seven thousands. Before the Aral began to recede in early 1960's, the city was considerably large with an economy based on mainly waterborn transportation and fishing. These activities disappeared by 1980. The harbours at Aral'sk , which earlier bustled with cargo and fishing vessels, is now a wasteland covered with salt, dust and sand with the rusting hulks of ships a scattered every where. The Arals'sk harbour at the former Saryshiganak Gulf has now been reduced to a small shallow remnant.[35]

In the past coal for household consumption in the Aral region was brought by rail upto Aral and from station to all cities and town by the sea transport. Today with the desication of the sea, the sea-bound transportation has ceased to exist. It has created severe transportation problem and has also generated acute unemployment problem in the region.[36]

As the sea has shallowed, shrunk and salinised, adequate productivity has rapidly declined. By the early 1980s, native fish species have disappeared. The fish catch

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35. "Central Asia Faces Unemplyment Problem", *The Curent Diegest of the Soviet Press*, vol. xxxix, n.14, 1987, p.4.

36. The Aral: A View from Space, Izvestia, June 23, 1987, Translated in *The Curent Diegest of the Soviet Press*, vol, xxxix, n.25, 1987.

from the sea which was 44000 metric tonnes in the 1950s has fallen to zero. The major fish canneries at the former ports of the Aral'sk and Muynak have reduced their work-force and barely survive on the processing of high cost imported fish from distant oceans. The decline and disappearance of fish stock in Aral sea is a tragedy for many inhabitants of the coastal areas. The employment directly or indirectly related to the Aral fisheries, reported at 60,000 in 1950s has disappeared or severely declined.[37] The demise of commercial fishing and other adversities have led to an exodus from Aral'sk and Muynak and the abandonment of former fishermen's villages.

Lack of employment and out-migration, poor drinking water quality, poor sanitation, high infact mortality and disease rate which worsened in the 1980s have had profound impact on the people of the region. There is a growing feeling that Central Government (Russians in Moscow) were not sufficently concerned with difficulties faced by the people in and around Aral region.

River Diversion Controversy

The Soviets embarked on such ambitious agricultural improvement policies as the 'cotton programme' and related 'virgin land programme' under Khrushchev and 'irrigation and

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37. Ibid.

drainage development programme' under Brezhnev, which, however, had initial economic benefits but ultimately resulted into eco-environmental catastrophe. Central Asia, was developed as an area of intense agricultural development through the water resources in the area of greatest demand ranged from barely adequate to quite inadequate. The planned expansion of irrigated hectarage ceased to have any future. On the other hand Aral sea was drying to a briny, residual lake or series of small lakes. It becomes necessary to resolve the problems of meeting food production requirement, maintaining at least present level of irrigation and its problem of restoring enough inflow into the Aral sea to stabilise its level. Maintaining the sea at some lower level than the present one, however, was only part of the problem. The salinity of the Aral sea must also be lowered if this vast inland sea is to remain ecologically viable. The solution of all these problems lay in additional supplies of fresh water, not simply what was available residually in Central Asia but from some additional sources outside the drainage basin. As almost all available resources in the region had been used so far, much of available residual water came from drainage fields which was highly saline and contaminated by herbicides, fertilizers and other chemicals. In the light of this, it was envisaged to divert part of water from the rivers of the Northern European RSFSR and Siberia (water surplus regions) southward to water deficient area of southern

USSR and Central Asia by a shorter and less costly canal system.

This inter-basin transfer of water was in some way related to the much publicised Stalin's or Communist Plan for the transformation of nature in the ex-USSR. EverSince the early 1970s, the official party and government line had been that this project was essential and required implementation by the turn of this century, to meet the increasing water needs of Central Asia. The October 1985 plenary meeting of the Communist Party was devoted to the long term reclamation programme upto the year 2000 AD and it resolved to start construction on this project. Design work for this Siberian river diversion canal was supposed to be completed by 1987 AD.[38]

Although there was simmering discontent about this river diversion project since long, public expression of the same began in 1985. Between September 1985 and the 27th party congress in late Feburary 1986, seething criticism and denunciation of diversion plan by well known Russian writers was published in national papers such as *Sovetskya Rossiya* , *Literaturnaya Gazeta* and *Pravada* and even theoretical journals like *Komunist*. Within a period of about a year, the project was dropped from the draft and final guideline of the 12th five year plan to be finally

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38. Micklin, Phlip P. "The Status of the Soviet Union's North-South Water Transfer Projects Before Their Abandonment in 1985-86." *Soviet Geography*, vol. 27, n.5, May 1986,

shelved in August 1986.[39]

The stopping of the design work on the Siberian project and postponing of the decision about its implementation indefinitely and the call for reexamining its economic viability or ecological consequences represented a fundamental change in the Soviet policy. The Central Asians vehimently supported the concept of Siberian diversion project because they all agree that the complexity of water, economic and population growth problems in Central Asia can not be resolved without this project. Professional water managers such as Victor Dukhovnyy, Director of the Central Asian Scientific Institute for Research on Irrigation (SANIIRI) continued to promote the Siberian diversion for the future of Central Asia. Pulat Khabibullayev, President of the Uzbek SSR Academy of Science, also supported water transfer. Diversion proponents argue that local water resources are insufficient to meet legitimate future needs and Central Asia can not survive without Siberian water.[40] Though the Russian nationalists strongly opposed the project on environmental grounds, the Central Asians wanted it to be implemented also because of their ecological problems. The plan was cancelled clearly on economic grounds as a waste of money and poor choice for capital investment.

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39. Ibid.

40. "Debating the Need for River Diversion", *The Current Digest Of The Soviet Press*, vol.xxxviii, n.7, 1986.

The Siberian project had long been favourably supported by all sections of society in Central Asia and the decision to stop its implementation extremely disappointed them. it was perceived as direct action of the dominated Moscow against Central Asia. Obviously there was conflict in the perception of costs and banifit in saving the Aral sea by launching this project and vice versa. Thus Aral seaturned into one of the key national symbols for the people in Central Asia. The question was increasingly asked in terms of 'if you really care about us, Moscow, and you really believe in the quality of nations, you had better done something to help us save the sea.'[41] Cancellation of Siberian River Diversion Project came as yet another shock to the people of Central Asia, who believed that Soviet central government was firmly committed to go ahead with it. The discontent gave rise to antagonism against the Soviets who were seen to be the decision-makers and injected hatred against Russian nationals. Thus the future of Aral sea proved to be an extremely sensitive issue and polarised the Central Asian people against Russians.

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41. "Along New Channels." *Trud*, April 7, 1983, p.4, Trans. in *The Current Digest Of The Soviet Press*, vol. xxxv, n.18, 1983.

Chapter - IV

ENVIRONMENTAL CONCERN AND UNREST

The unchallenged success of industrialisation in the USSR created striking environmental problems which can no longer be ignored. Notwithstanding some sporadic and minimal efforts to check the environmental, it degradation, it continued to grow taking a catastrophic shape. The continuation of earlier priorities (productive over the ecological concern), hindered the ecological reforms. On the other hand, vocal enviornmentalists confronted the existing system and ecological concern came to be recognised as legitimate and important on broader platforms.

Awareness of the Problem

Soviet party and bueaucrate apparatus had a general appreciation that industries and agriculture poured millions of tons of pollutants annually into the air and water-ways. But they lacked, until recently, sufficient scientific knowledge of the ecological impact of these wastes. While the soviet Government enacted a number of environment and conservation related resolutions, their enforcement was half-hearted. Apart from this increased governmental activity, Soviet leaders remained reluctant to acknowledge

the full magnitude of the problems. A part of their reluctance stemmed from a sense of embarrassment and the long standing practice of suppressing unfavourable information about State activity. The traditional penchant for secrecy also restricted the level of awareness. M.D. Milionshchi Kove, First Deputy Chairman of the USSR Academy of Sciences, justifies this saying : 'we treat these problems a little differently. Open discussion in the press and in the public does not always produce a review of the problem from the right point of view. We try to consider this in scientific discussions, not in public.[1] It is only recently that officials began to permit fairly open discussions on environmental problems in the otherwise censored media. At times, they even denied publication even to modest critics.

Awareness first dawned among the members of the Soviet scientific community and they have been among the most aggressive advocates of pollution abatement and conservation programmes. More than any other groups, the scientists remained in the forefront in raising the environmental awareness (against the adverse effect of pollution) and pressed for effective preventive steps frequently waging an uphill battle against hostile government, bureaucratic and industrial managers, sceptical fellow scientists and the

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1. Kelley Donald R., and Others, The Economic Super Powers and the Environment : United States, The Soviet Union and Japan (San Fransisco, USA : W.H. Freeman and Co., 1976), p.133.

apathetic public.

Despite the preeminence of scientists in the development of environmental awareness, serious limitation as a product of the same 'closed bureaucratic system' and state's attitude of the 'environmental and resource colonisation' restricted their activity. Research in the field of environmental issues was poorly coordinated and ill funded. Highly compartmentalisation was typical of the evironmental research, with separate institutes dealing with specific fields of activity of individual pollutants. Research work was also retarded in the past by general unwillingness of the central ministers to acknowledge the problem. The accurate disclosure of the magnitude of the problem was also suppressed in the prevailing system. Non-scientific intelligentsia also helped in raising the environmental awareness and contributed, although in lesser magnitude, to the growing public discussions. However, the political imperative of retaining decision-making power in the hands of top communist party officials had limited the power of environmental lobbies, which would have played an important role in boosting environmental awareness in the centralised political system.[2]

While environmental deterioration and resource conservation occupied the attention of a handful of scientists and intelligentsia, the upsurge of public awareness of the environmental problems was subjected to

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2. Ibid., n.1, p.130.

restriction imposed on the discussion of questions. General public attitudes toward man's relationship to nature and the pressing desire to enjoy the benefits of industrilisation also dulled the environmental awareness of the common masses. There was an attitude of the environmental colonisation taking the view that the natural wealth is virtually inexhaustible and that it is man's fate to conquer and reshape the nature.[3] While de-emphasising the environmental concern not only dulled the environmental awareness but also aggravated the environmental deterioration. The demands for everyday life, child care, transportation etc. relegated the environmental concern to a position of secondary importance. Then the popular image of the environment in the ex-Soviet-Union was a combination of indifference and ignorance. Although workers living near polluting industries were clearly aware of the problem but wide-scale public attention was very limited and localised. Lack of adequate media coverage of environmental questions was partly responsible for dormant public awareness.

The catastrophic cost of accident at the Chernobyl nuclear power plant in April 1986 served as a catalyst in activating public awarness of the potential environmental mishaps. With expanding openness under 'glassnost' Soviet citizens gained access to information about other less

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3. Ibid., n.1, p.135.

dramatic forms of environmental deterioration.[4]

Most dramatic change in the Soviet environmental affairs has been the astounding expansion of information available to public about actual condition of environment. The new attention paid to the environmental issues was evident in a number of articles and books published on the topic. Previously data about pollution level land health effects of pollution etc. were available to only few, mostly among scientists, intelectuals and government officials. Now they were published widely in mass media. In addition to these general indicators, specific articles on regions with intance ecological problems also appeared in the local and central media. Besides discussions on pollution and other environmental problems spread from scientific journals to popular journals and newspapers such as *Literaturnaia Gazeta, Novii Mir, Nash Soveremenik* and *Komsomolskia Pravda* and finally to mass cerculation dailies such as *Pravada* and *Izvestiia*. That served to bridge the gap between specialist and general public.[5] The release of new information sparked popular interest about environment related health hazards. Thus by making information available to the interested public about the scope, source, regional distribution and health effects of specific environmental problems mass

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4. Goldman Marshall I, "Environmentalism and Nationalism : An Unlikely Twist in Unlikely Direction," in Stewart John Messey's (ed.), *The Soviet Environment : Problems, Policies and Politics* (New York : Cambridge Univ. Press, 1992).

5. Kelley, n.1, p.134.

media became an independent actor in the battle for environmental protection.

Despite the increased access to information, secrecy still surrounded certain issues and the authors of article in the Soviet mass media did not had the concerned writer did not have the freedom to examine all aspects of environmental protection. Many data were not relased to the public, which was the result of an negative aspect of the censored mass-communication. But after 1986 the situation changed radically as a result of 'Perestroika'. This resulted in a vertual revolution in the awareness of environmental problems. The *Literaturniia Gazeta* a relatively liberal weekly and mass dailies such as *Pravda* and *Izvestia* regularly published articles and comentaries on environmental issues.[6] Similar articles appeared in national and regional media as well. Diverse groups of scientists, writers, representatives of mass-organisations began to express their concern through the mass media. This campaign gained intensity in the late 1980s. In November 1989 a Supreme Soviet resolution itself depicted several areas of country at crisis or near crisis stage. It also described the situation in and around the Aral sea region as 'out of human control.' The information provided ammunition

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6. See, "Look Back in Alarm," *Pravda*, August 4, 1988; "Explosion at Bereliam Production Factory," *Izvestia*, November 4, 1990; "How is the Air at Alma Ata City," *Izvestia*, June 13, 1989; "Blue sea at the Precipice," *Pravda*, August 13, 1988; "Is the Water in the AmudaryaTasty ?", *Pravda*, August 13, 1985; "The Drama of Water," *Pravda*, August 11, 1989.

for feeding the grass-root environmental movement all over the USSR and also in Central Asian region. At the beginning of the 1990s the environmentalists had diversity of outlets for public expression of their views. Scientists were also able to publish data and other information in mass media which where previously kept secret. This in turn helped the scientists making the public aware of the hazards around them. The availability of published data from established scientists legitimised and activated latent fear and suspicions among the masses. Thus ecolgical *Glasnost* acted as a catalist to environmental activism.[7]

Environmental Movement in Central Asia

Group activity, particularly among the specialists was an important aspect of Soviet environmental protection but this participation was habitually manipulated and channelled to conform with regional priorities. A qualitatively different situation began to emerge under *Perestroika*. More importantly, *Glasnost* brought with it not only more openness but an end to the ban on unauthorized organisations. Prior to Gorbachev it was illegal to form or join any organisation not officially registered with and supervised by the state authority which inhibited formation of any group or organisation. Complaints against environmental degradation were voiced on behalf of

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7. Zigler Charles E., "Political Participation, Nationalism and Environmental Policies in USSR," in Stewart John Massey's, (ed.), *The Soviet Environment : Problems,Policies, and Politics* (New York : Cambridge Univ. Press, 1992).

'biosphere protection' or on behalf of 'economic efficiency' primarily by the 'society for the protection of nature.'[8] Individuals had been espousing adhoc environmental concern for sometime but in almost every instance they were not formally organised or coordinated.

An integral part of the restructuring process in Central Asia, as elsewhere in the ex-USSR, has been the appearance of 'private citizens' initiative in the public life. The most visible part of their initiative in the political and social life has been formation of informal groups, social activist which mushroomed all over the region seeking social change and restructuring.[9] Almost overnight thousands of non-government organisations, with collective subject of action, independent of the earlier existing 'closed bureaucratic system' appeared and expanded their activity. The entire sphere of amateur associations did not contact the state system. They were eager to participate, in a concrete way for solving the ecological problems, to protect and restore historical monuments, history and culture etc. and to resist any alien (in this case Russian) encroachments.[10] These associations had a common idea of participation in transforming and

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8. Panel on Soviet Union - In the 2000 (editional note), *Soviet Geography* vol. XXVIII, n.6 June 1987.

9. "Our Own Action Are The Guarantee Of Success," *Izvestia* April 21, 1987, p.3. trans. in The Current Digest Of The Soviet Press, vol. XXXIX, n.16, 1987.

10. Ibid.

restructuring the society and thus there was a common denominator in the groups' social orientation.

In the case of Central Asia, a heterogeneous mixture of the grass-root organisations, national groups and movements emerged. Even some old political movements dating back to the pre-Soviet era were revived.[11] They have played a prominent role in the contemporary social and political movement in Central Asia. These informal groups aired the environmental, economic and social problems that have been accumulated in the region for decades, with the tempo of social and economic change. They also took advantage of their widening mass suppot to the articulation of their political aspirations. Earlier discussion on the existing socio-economic and environmental problems were largely the preserve of political leaders and intellectuals who had regular access to the information. But these new informal groups activated and provided an opportunity for ordianry citizens to become involved in political action on the issues concerning them driectly. Along with this, *Glasnost* and *Perstroika* made it possible for a large number of unofficial organisations of various persuasions to enter the political arena. More often they voiced extremist anti-Russian slogans thereby becoming the focal point of public

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11. Ziegler, Charles E., "Political Participation, Nationalism and Environmental Politics in the USSR", in Stewart John Massey (ed.), *The Soviet Environment : Problems, Policies and Politics* (New York : Cambridge University Press, 1992).

protest against the perceived Soviet policies.[12]

The changes taking place in the contemporary social life brought into focus ecological problems in Central Asia and particularly the Aral Sea crisis as one of the most urgent problems. The Chernobyl nuclear accident drew attention from every quarter of the society to the very real environmental danger related to the productive system. At the same time it made evident the unreliability of the official reassurances about the environmental safty. The 'Glasnost' had finally helped in opening up (although by no means completely) the Soviet soico-poltical system. Reports and hitherto confidential statistics on the death rates and the level of air, water and other pollutions, now became public. It generated large scale public resentment and helped in the emergence of ecological mass movements. Under the radical upheavals taking place in the society, many environmental groups cropped up and made public aware of the reality. The public was warned that they are standing on the brink of an inevitable ecological catastrophy, as a product of the 'dead end of the path taken for development' in the last 30 years and due to the cheap solution of the problems of protecting nature and environment. The diktat of Moscow, was held responsible for

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12. "On the basis of Leninist Principles , to a New quality of relations between Nationalities," *Pravda* , September 1989, p. 1-7, Trans. in *The Current Digest of The Soviet Press*, vol.XL, n.39, 1989.

all their sufferings. Thus important social contradictions between the closed bureaucratic system and others were articulated. This also created a counterveiling power against establishment. By now it became increasingly clear that the 'closed bureaucratic system' has poliferated and promoted its own well-being (through internal resource colonisation) at the cost of exploiting the environment and depleting its nonrenewable human and natural resources.

These movements were for the most part oriented to bring change in the system of values and put forth the demands for changing the economic system and to bring in more just and rational distribution of resources. Many environmentalists believed that ex-Soviet Union's dominant political institutions and processes must be reformed or changed becuause they had suspicions over the establishment, traditional institutions and processes associated with it.

Environmental organisations took up the issue of ecosystem, of which people are a part, as their cornerstone. Accordingly their demands were not just directed to outwardly relations to economic and political institutions but primarily to the immediate environment. Thus their degree of organistion and capacity of mobilisation was at grassroot level and the anti-establishment sentiments were much stronger.Many groups marching under the environmental banner have grown almost continuously in number and the soical support base of these environmental groups became

broad. Viewed from close range the environmental movement permeeted into many different organisations with diverse political agendas, strategies and memberships. With rapaid political changes in the USSR these groups became more articulate and agressive in focussing their demands. Their activity constitutes the bed rock of Central Asian environmentalism upon which the politics of local environment is based.[13]

Glasnost and *Perestroika* came in hady to these social activist groups to launch an offensive movement against the Soviet priorities and politices. The constant diffusion of new information identifying environmental ills generated more heat in the movement for environmental protection. Public apprehensions about hazardous and toxic wastes was heightened by repeated new discoveries. Information about the incidents of real and suspected community exposure to all environmental ills became a commonplace. It was now known that citizens have been exposed unknowingly in sudden and dramatic ways to the toxic substances orginating in previously undiscovered or neglected waste sites or transported through the ecosystem by careless chemical use.

This activism aroused or emboldened citizens to oppose the local hazardous waste sites and establishment of new plants on environmental grounds . There has also been an

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13. Zigler, n.11.

explosion of adhoc state and local groups. The NIMBYism thrived because of numerous and ever increasing state laws that authorised citizens' activism. It acted as a catalyst to mould public consciousness about nuclear power plants and other catastrophic costs of development. NIMBYism was crowded with well-educated, socially active and organisationally experienced people. Thus NIMBYism become another political force of public environmental protest movement.[14]

Ecological protest movements started on the grounds of Siberian river diversion plan, ground water pollution and Aral sea tragedy etc. and provided for intellectual and general discontent over the environmental issues, that has been simmiering for long. During this phase the protest movements opened and widened their strength and affect. Press accounts of the informal groups in the Central Asian republics began to appear during late 1980s with particular reference to their involvement in the environment problems. Their most positive contribution at the stage of their infancy was to activate the bureaucracy to take action for dealing with these problems. Public outrage over the environmental deterioration and associated health problems also put pressure on the political leadership, management of enterprises and central officials to take remedial measures to reduce environmental changes. Interest groups

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14. "Panel on Soviet Union - In The Year 2000", n.8.

have also played a crucial role in mobilising public opinion and generating pressure on the law makers. As a ressult ecological problems, both in general and in terms of specific area, have been a subject of discussion at several politburo meetings and numerous strictures have also been pased during the closing years of 1980s. This political activism and increasing concern about the adverse environmental effect of certain major industrial projects (NIMBYism) developed to such an extent that some of these projects were cancelled and construction work on some major projects were discontinued. While some of these issues were taken by Central authorities, others were sorted out by authority of the all Union or republic *Goskompreroda* or at the initiative of the local authorities.

One of earliest ecological groups in Kazakhstan was established in the highly polluted city of Palvador namely 'Republican Coordinating Commission on Ecology and Hygiene,' which initiated and managed to stop the construction of a vitamin concentrate plant in 1988. Protest in Tashkent over Moscow's order to build an electronic factory in a nearby mountainous recreational area led to the formation of *Birlik* (unity).[15] The public demonstration organised by *Birlik* also called for attention to problems such as Aral sea. The *Birlik* leadership saw the shrinking of the Aral

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15. Fierman, William, "The Communist Party, Erk and Changing Uzbek Political Environment," *Central Asian Studies*, vol.10, n.3, 1991.

sea as a regional ecological disaster and wanted the sea to be protected. On this issue *Birlik's* natural ally was Uzbekistan Writers Association which also addressed to this problem. In Kazakhastan, the nascent opposition group *Adalat* (Justice) and in Kyrgyzistan popular movement *Ashar* (effect) are most vocal advocates of environmental protection and natural preservation.[16] Another Uzbek popular group *Erk* (freedom) also called for preventive steps against air and water pollution.[17] Ecological concerns have also been a recurring theme on the draft programmes of *Rastakhaiz* (renaissance) and *Agzybirlik* (unity), both being the leading political opposition groups in Tadzhkistan and Turkmenistan respectively.[18] Damage caused by agricultural and industrial practices have been special target of these groups.The most prominent environmental group in Kazakhastan was undoubtedly the *Nevada-Semipalatnisk* movement, the main goal of which was to stope all nuclear weapon testing in Kazakhstan and the responsible handling of radio-active wastes.

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16. Ro'i Yaacov, "Islamic Influence on Nationalism in Soviet Central Asia," *Problems of Communisim*, March 1990, pp.42.

17. Ibid.

18. Ibid.

Environmentalism and Nationalism in Central Asia

The growth of environmentalism in Central Asia i partly a reaction to Moscow's policy of cottc monoculture and associated problems in terms of wate resources depletion, chemical and industrial pollution an salinisation. In each Soviet Central Asian republics al ills of industrialisation or agricultural development an the resultent pollution were ascribed to Moscow's fault policies. This was more so because industrial activity an their regional concentration in various republics wa achieved as a result of faulty decisions by centra planners in Moscow without taking local factors int consideration. This information and perception in Centra Asia only served to alienate the non-Russian peoples fro Moscow.

Most of the ecological problems are territorial i nature, that is, their effects are felt most strongly i specific localities. The environmental activists perceive a clear association between the dominance of Centra Economic Organisation, superimposed cotton monoculture, resources colonisation and the environmental degradation. The harsh living conditions and deteriorating health o their people was the tragic consequence of the industrial expansion and garbage imperialism (establishment of Toxic and Radio active plants) in the region. Thus the

environmental problems were cited as a conspicuous example of Russian domination and bureaucratic unresponsiveness to Central Asian situation. Nazarbayev, the then, First Secreatory of Kazakh Communist Party Central Committee, and presently President of Kazakhstan blamed the rigid centralization of managment and the all powerful diktat of central ministries for the existing problems in his republic. He aksed, "who will apologize to the Kazakh people for the fact that their homeland was forcibly turned into branches of gulag?"[19] He also alleged that millions of hectares of Kazakhstan have been kept out of economic use by military establishments alone.[20] He blamed Moscow for ignoring the public demand to close testing of nuclear weapons on their territory which have been conducted for about 40 years.[21] Nazarbayev wanted his people to be compensated for losses suffered due to these factors.[22]

Another off-shoot of the cotton monoculture in the Central Asian region and its industrialisation based on the colonial mode of production has been the growing unemployment problem among the Central Asian population and the increased influx of Russian skilled workers. Even according to incomplete data, there are about 1 million

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19. See Nazarbayev's speech at the CPSU Central Committee, Moscow, on September 19, 1989, in *Pravda*, Sept. 21, 1989.

20. Ibid.

21. Ibid.

22. Ibid.

unemployed in Uzbekistan alone. Central Asia is noted for having the high rates of population increase among the republics of ex-USSR. Those rates were twice the union average. Naturally this growth was aggravating the already acute problems of employment.[23] The acuteness of employment problem was in many ways due to an insufficiently flexible and imperfect machanism for planning and management of labour resources. The lopsided industrial development of the region has also aggravated the situation. At the same time economic disadvantages were superimposed upon objective cultural division of labour. There was high influx of Russian skilled workers that occupied the key positions in the Central Asian economy, depriving the locals from their due share. They not only commanded many of the better urban jobs but also symbolised Moscow's penetration in these republics. This pattern of cultural division of labour was the product of internal colonialism and this situation had a potentially fertile ground for mass disorder and local ethnic unrest.[24]

The environmental movement began to shift its focus to political issues in response to the altered political

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23. Gllason, Gragory, "The Political Economy of Dependency Under Socialism : The Asian Republic in the USSR", *Studies in Comperative Communism*, vol. XXIV, n.4, 1991, pp.335-53.

24. Stevenel Burg, "Central Asian Elite Mobility and Political Change in Soviet Union," Central Asian Studies, vol.5, n.3/4, 1986.

situation in USSR during the later years of Gorbachev. Different nationality groups began asserting their rights to own and administer and their land, as per their choice because they associated the growing pollution of their homeland with the Soviet imposed systems of cotton monoculture and related problems. Some of these activist groups visualised a solution to their problems in political separatism. It was the local environmental movement in different Central Asian republics which actually sparked and then spearheaded that effort.[25]

The environmental movement has also stimulated (generated) participation on nationalistic lines because it emphasised the lack of control that individuals had over their lives under the Soviet system. As the democratisation forces progressed under Gorbachev Soviet citizens began to avail new opportunities to limit or reverse central government decisions that were adversely affecting their well being. The groups protesting to Moscow about the deterioration in local environmental conditions quickly became the nucleus of other more active political groups which in turn took advantage of the newly relaxed laws on the establishment of local non-governmental groups for articulating their long standing ethnic and religious

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25. "Unoffical Groups Mushroom : What Limits?" *Current Digest of The Soviet Press*, vol. XXXIX, n.39, October 1987.

grievances.[26]

The question of protecting the ecology of the Central Asia Republics was now linked to that of the sovereinty of these republics. Deformations uncovered under conditions of *Glasnost* and *Perestroika* had produced serious breaches in social balance and their life. In Kazakhastan the nascent opposition group *Adalat* (justice) called for more autonomy at the local and regional level. The Kyrghiyz popular movement *Ashar* (effect) also advocated increased economic autonomy. In Uzbekistan nationalist movement *Birlik* (unity) propagated national revival and independence. A moderate wing of Uzbek mass movement, *Erk* (freedom) that was reportedly split away from *Birlik* called for economic and political automony within the framework of renewed federalism. The Tadjik movement *Rastakhez* (Renaissance) which played a prominent role in Dushanbe disturbances also advocated more autonomy within a federation. In Turkmenistan, the newly formed *Agzybirlik* (unity) had similar agenda like its Uzbek counterpart.[27]

The growing protest over the abuses served as a ralling point for those whose nationalistic aspirations had

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26. Debardeleben John, "The New Politics in the USSR : The Case of the Environment," in Stewart John Massey, (ed.), The Soviet Environment : Problems, Polices and Politics (New York : Cambridge University Press, 1992).

27. Ro'i Yaacov, op cited.

long been dormant . In fact most of these nationalistic movements trace their origin to the early protests about environment. The coming up of the age of environmental concerns and the new era of *Glasnost* combined to give rise to hitherto suppresed nationalistic yearnings.

Environmental portest movement not only served to supplement the cause of ethno-religious nationalism but in some case even fuelled the same. *Glasnost* had allowed environmental concerns to be frequently and vociferously aired. Public hesitation to voice opinion on environmental issues quickly waned away. Instead of writing mere letters to newspaper editors, the preferred mode for driving home a point became street demonstrations. Popular demands were being articulated through massive demonstrations petitions and the activities of thousands of independent social and political organisations. This rapid emergence of qualitatively new from of political participation was atributed to several closely inter-related factors.

Nationalism and environmentalism shared several common bases that significantly affected their political participation and eventual merger. Both were emotionally charged issues and were closely related to identity question in Central Asia. The extent of past deformities in the realm of economy, ecology and inter-ethnic relations and above all the centre-peripheral relationship, came in for strong and open opposition. It brought to light the disastrous environmental conditions with its pervasive and highly

visible impact on public health thereby creating objective conditions for popular unrest.

At the same time *Glasnost* made possible the relatively free exchange of information and ideas which was necessary for effective discussion of political issues. The acceptance of socialist and political pluralism legitimised the aggravation of diverse interests by organisations not directly under the control of Communist party.

Towards the late 1980s and early 1990s ethnic-nationalism emerged as a major force in Central Asia. Numerous issues combined together and led to local outbrust angainst the Soviet policies and Russians. This got relfected in inter ethnic clashes and violence that rocked Alma Ata (Decemeber 1986) Novyuzhen (in 1989) Ferghana (in 1989 and 1990) and Dushanbe (in 1989, 1990). Environmental protest movement played its own role in letting the hitherto dormant ehtno-nationalistic outbrusts open in the form of protests, demonstrations and so on.

CONCLUSION

Externally induced modifications within the Central Asian region brought fundamental changes in the eco-envioronmental structure of the region. The process of modernisation and regional development was imposed by the development pattern suited to Soviet economy and the structure of the regional economy during that period underwent the exploitative mechanism. The mode of production in the peripheral regions (Central Asian Regions) were developed for the benefit of the Centre (Moscow) that persisted up to the last in many of its essential characteristic. A proper suction mechanism extended from the periphery to the core and the surplus was siphoned out mainly to the Moscow. It was primarily an export of primary products. Mono-crop specialisation in the Central Asian region was the testimony of this dependent mode of production.

This dependent mode of production has had an upsetting effect on the ecology and economy of the region and brought in complete derangement in their ecological and economic setup. This situation was complicated by one sided and hypertrophic nature of development. Rapidly growing population in the Central Asian region coupled with added demand for food, living-space and the inevitable weight of the domestic and industrial the ecological wastes also

worcened balance. Every medium of the environment was impregnated by the industrial and agricultural affluents.

The most serious effect of the regional disparities in the levels of developments and environment degangment was witnessed in the field of imbalance in regional water management. The most catastrophic cost of agro-industrial development was put in the form of dying Aral sea. Heavy withdrawal of water from important feeders of the Aral sea (Amudarya and Syrdarya), without any return flow brought-in desication of the sea. It adversely affected the water management system in the region and also agriculture which was main occupation of the people of this region. Another aspect of the problem of water resource management was related to the question of adequate supply of fresh water. Besides the desication of Aral sea, regional water bodies were also ferociously assaulted by contaminants from growing industrial and agricultural base. Thus, the miscalculations that have been made and voluntarism that has seen shown in developing the location of productive forces have created an exceptionally strained ecological situation. There is another added list of problems of serious mistakes of ecological management. It all were contributed by the excess and command administrative, arbitrary and distorted approach that was taken in so called 'cotton affairs'.

In each Soviet Central Asian republics all ills of industrialisation or agricultural development and the

resultent pollution were ascribed to Moscow's faulty policies. This was more so because industrial activity and their regional concentration in various republics were the result of faulty decisions by Central planners in Moscow without taking local factors into consideration.

The future of the Aral sea is causing increasing public concern because the fate of the people of this region is closely related to the Aral sea. The conciliation of inter basin transfer of water was a shock for the people of the region. It only brought antagonism and hatred for central planning. People perceived it as trading of pollutants by the Moscow. There was a feeling that the central planners have allowed pollution to grow to an unexhorabel level in the Central Asian region. There was also a strong feeling that. Moscow was dumping environmentally harmful industries or economies in the local areas and the region was not given adequate attention for pollution clean-up.

There was also a belief or fear that local natural resources were exploited in unconsidrable manner for the benefit of the other regions. The environmental unhappiness and general dissatisfaction with the lack of local control over the important environmental decision making directed peoples' spirations for environmental protest and mass movement.

The demand for management of the lcoal environment and resources widened to give birth to 'politics of environmentalism.' The idea of 'national periority' started

striving with all their might to instill in people's minds the firmely established image of an external enemy.

The growing protest over the abuses served as a ralling point for those whose nationalistic aspirations had long been dormant. In fact most of these nationalistic movements trace their origin to the early protests about environment. The coming up of the age of environmental concerns and the new era of *Glasnost* combined to give rise to hitherto suppresed nationalistic yearnings. Environmental portest movement not only served to supplement the cause of ethno-religious nationalism but in some case even fuelled the same. It also provided and antigovernment or antiparty an sometimes anti-Russian conflict as it was perceived that the interest of the local ethnic community was infringed for the benefit of Russia. It led to the merger of environmentalism with that of nationalism. The outbreak of popular unrest ethnic clashes and separatist movement.

The out-break of the popular unrest, ethnic clashes and separatist movements in every concern of the former Soviet Union in late 1980s could not be ascribed to a particular issue or area or viewed just as a function of the local phenomena or the minority problem. In fact local nationalism, particularism and seperatism were manifestations of more complex problems besetting the ex-USSR. The social, economic, environmental and political issues got ethnicised and vice-versa. In recent years the

republics were able to strengthen considerably their political, economic and cultural resources, and thus change the balance in the "centre-periphery relationship." Thanks to 'Prestroika' and 'Glasnost' they challenged the legitimacy of centre, blaming it as an 'alien dominance' and perceived it both as an exploiting class and as a threat to the local ethnic, cultural and linguistic heritage. Ultimately it served to transform 'regional autonomist' movement into outright 'ethnic regional movement.' The separatist groups thus conceived itself to be in an unsatisfactory dependency status. These economic factors essentially got coupled with racial, cultural and social factors as well. Thus an environmetal hazard as a product of Eco-Enivornmental colonisation by an alien state or group worked for motivation of such separatist movement or the national conciousness to mobilize that conciousness as a force for separatism.

Nationalism become a major force in Central Asia. The large scale rioting in Alma Ata, the capital of Kazakhstan. Similar violances took place in Novyuzen (Kazakhstan) against the people residing there, and in Ferghana (Uzbekistan) against the Musketian-Turks in 1989 and 1990 respectively. Dushanbe was also disturbed in 1989 by ethno-national resurgence.

The co-encient murging of the environmentalism and nationalism has given the ex-Soviet environmental movement, a character that sharply distinguishes it from the

environmental movement that existed in other parts of the world. Whereas the 'Green Movement' in the rest of the world seek to unify forces to control waste and eliminate pollution. The environmental movement in the Central Asian region demanded for more control over resorces and more automony. This peculiar nature of environmental movement of Central Asia also acted as a catalyst for the outbrust of nationality consusness and led to separatist movement.

Environmental Politics and mass protest movement from Central Asian republics indicate that rigional disparities in the level of economic development and environmental problems give rise to rigional consussness and NIMBYism agrevates this situation. Cultural (ethinic division of population acts as bed-rock for envirolmental protests on ethno-regional line.

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